



Environmental and Social Impact Assessment (ESIA)

**130 MWp solar photovoltaic (PV) plant project in Menzel Habib
in the governorate of Gabes**

REPORT	Environmental and Social Impact Assessment (ESIA) for the 130 MWp solar photovoltaic (PV) plant project in Menzel Habib – Gabes Governorate – Tunisia
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REPORT REVIEW

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This report has been prepared in accordance with EAM's Integrated Management System.



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ACRONYMS & ABBREVIATIONS

ANGed	National Waste Management Agency
ANME	National Agency for Energy Conservation
ANPE	National Environmental Protection Agency
CA	Alternating current
CAE	Electricity Purchase Agreement
CC	Direct Current
CDN	Nationally Determined Contribution
CDP	Community Development Plan
CEDAW	Convention on the Elimination of Discrimination against Women
CEPF	Critical Ecosystem Partnership Fund
CLO	Community Liaison Officer
CO ₂	Carbon Dioxide
CPG	Gafsa Phosphate Company
CRDA	Regional Commission for Agricultural Development
CSP	Concentrating Solar Power
CSR	Corporate Social Responsibility
DGEER	Directorate General for Energy and Renewable Energy
DGF	Directorate General of Forests
DGRE	Directorate General for Water Resources
DTM	Digital Terrain Model
E&S	Environmental & Social
EAM	Environmental Assessment & Management
EBRD	European Bank for Reconstruction
EEC	European Economic Community
EMF	Electric and Magnetic Fields
EPC	Engineering, Procurement, and Construction
EPRP	Emergency Preparedness and Response Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
ESP	Environmental and Social Policy
ESR	Environmental and Social Requirement
EU	European Union
GBVH	Gender-Based Violence and Harassment
GHI	Global Solar Radiation
GIIP	Good International Industry Practice
GWh	Gigawatt hour
HSE	Health, Safety, Environment
HT	High Voltage
IBA	Important Bird Area
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IFC	International Finance Corporation
IFI	International Financial Institutions
IGP	International Good Practice
ILO	International Labour Organisation
INP	National Heritage Institute
INS	National Institute of Statistics
iRAP	International Road Assessment Programme
IUCN	International Union for Conservation of Nature
KPI	Key Performance Indicators
kV	Kilovolt
KWh	Kilowatt hour
LILO	Loop-In Loop-Out
ME	Ministry of the Environment
MIME	Ministry of Industry, Energy and Mining

MSK	Medvedev-Sponheuer-Karnik
MT	Medium Voltage
MWp	Megawatt peak
NGO	Non-Governmental Organisations
NOAA	National Oceanic and Atmospheric Administration
NTS	Non-Technical Summary
OACA	Civil Aviation Authority
OHS	Occupational Health and Safety
ONAS	National Sanitation Office
PPA	Power Purchase Agreement
PS	Performance Standards
PV	Photovoltaic
QHSE	Quality, Health, Safety, Environment
RIO	Operator Identity Statement
RN	National Road
SNCFT	Tunisian National Railway Company
RoW	Right of Way
SEAH	Sexual Exploitation, Abuse and Harassment
SEP	Stakeholder Engagement Plan
SME	Small and Medium-sized Enterprises
STEG	Tunisian Electricity and Gas Company
TBT	Tool Box Talks
TL	Transmission Line

1.0 INTRODUCTION

As part of its energy transition strategy, Tunisia has set itself the target of achieving a share of renewable energies in the electricity mix of 35% by 2030 and 50% by 2035. This will result in the installation of a total functional renewable capacity of 4,850 MW by 2030 and 8,350 MW by 2035 using photovoltaic and wind.

Voltaia (hereafter referred to as "the Developer"), was awarded in December 2024, an Agreement for the development of a 130 MWp Photo Voltaic (PV) Solar power plant in the governorate of Gabes hereafter referred to as "the Project" or 'PV Plant Menzel Habib'. Voltaia was selected after an international competitive call of tenders launched by the Government of Tunisia under the reference AO-01-2022, represented by the Ministry of Industry, Energy and Mining (MIME).

The Developer aims to finalize the project financing by December 2025 and to start construction of the solar PV plant in January 2026, with a planned duration of 18 months. The estimated commissioning date of the solar PV plant is June 2027.

This Environmental and Social Impact Assessment (ESIA) has been prepared in accordance with the International Finance Corporation (IFC) of the World Bank Group including the IFC Performance Standards (2012 edition) and Environmental Social Policy (ESP - 2024) of the European Bank for Reconstruction and Development (EBRD).

1.1 PROJECT CONTEXT

As part of its energy transition strategy, Tunisia has set the objective of achieving a renewable energy share of 35% in the national electricity mix by 2030 and 50% by 2035. This target will be met through the deployment of a total operational renewable energy generation capacity of 4,850 MW by 2030 and 8,350 MW by 2035, primarily based on solar photovoltaic and wind power. Within this framework, the Tunisian government launched the tender AO-01-2022 for the development of solar photovoltaic power generation projects. Following this tender, Voltaia was awarded in December 2024 the development of a 130 MWp solar power plant in Gabes governorate under the concession regime. The concession agreement and the power purchase agreement (PPA) for this Project were signed on March 24, 2025, respectively with the Ministry of Industry, Mines and Energy and with STEG.

The electricity sale agreement guarantees the exclusive sale of the net electricity produced by the solar PV plant of Menzel Habib to STEG. The terms and conditions of sale and the price of the electricity are defined in this agreement.

1.2 Objectives of the ESIA

The objective of ESIA is to identify and assess the potentially significant existing and future adverse environmental and social impacts associated with the Developer's proposed Project, assess compliance with applicable laws in Tunisia, the IFC PS (2012) and the EBRD ESP (2024) and Environmental and Social Requirements (ESRs), determine the measures needed to prevent or minimise and mitigate the adverse impacts, and identify potential environmental and social opportunities, including those that would improve the environmental and social sustainability of the Project and/or the associated current operations. The assessment process has been designed to ensure that it is commensurate with, and proportional to, the potential impacts and issues of the Project.

In parallel with the ESIA, Non-Technical Summary (NTS), Environmental and Social Management Plan (ESMP) and a Stakeholder Engagement Plan (SEP) have been undertaken.

2.0 PROJECT DESCRIPTION

2.1 Project Location

2.1.1 Solar PV Plant and 225 kV transmission line (200 m) location

Tunisia is divided into 24 Governorates which are subdivided into 264 delegations, further subdivided into sectors. The Project site is located within Gabes Governorate in the delegation of Menzel Habib, and within El Mehemla sector. The nearest community to the project site is El Mehemla, located 2.3 km to the north. Menzel Habib lies 11 km away, while the city of Gabes is situated 70 km from the solar PV plant.

The project also includes the construction of 200 m of transmission line (including 3 pylons) located south of the solar PV plant, designed to evacuate the electricity generated to the existing Bouchamma–Mdhilla 150 kV transmission line linking Bouchamma to Mdhilla substations through a LILO (Loop-In Loop-Out) connection. Although, the Developer will undertake reinforcement works to upgrade its voltage from 150 kV to 225 kV.

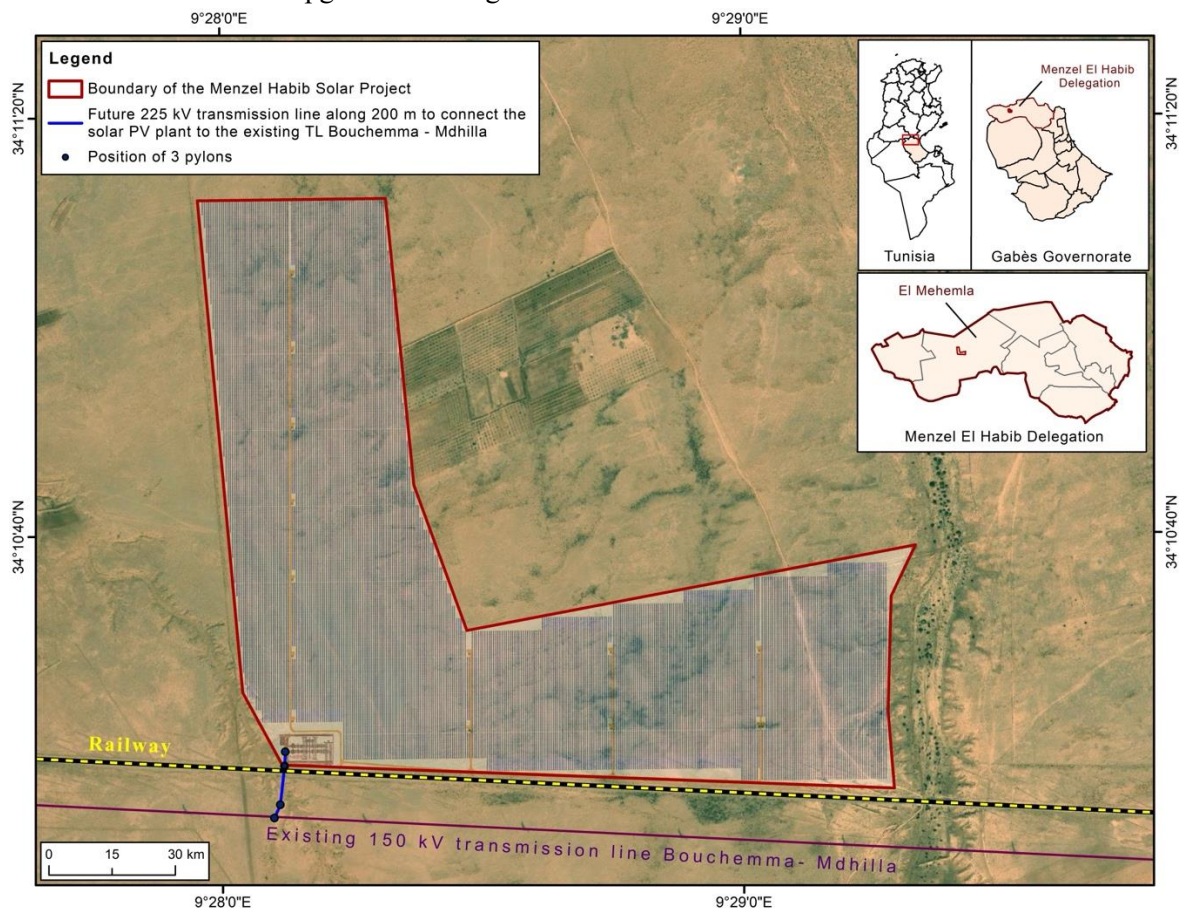


Figure 2.1 - Administrative map of the study area

The construction and operation of the solar PV plant will be carried out on uncultivated and uninhabited land. The land is under private ownership and covers an area of 200 hectares of which only 175 hectares will be used for the project. The land is being leased to one landowner under a *willing lessee, willing lessor* arrangement. The undeveloped land is currently used for herding activities by the landowner for his own livestock. The activities are carried out by his employees. Additionally, consultations with the landowner confirmed that no informal grazing activities are being conducted.

The site is generally flat, accessible from the nearby national road of RN15 following by an access track of approximately 4 km.

2.1.2 Location of the existing 150 kV transmission line Bouchamma – Mdhilla

The existing transmission line is a single-circuit line connecting the Bouchamma and Mdhilla substations over a distance of 140 km, which has been operated by STEG for over 40 years.

The route of this TL crosses two governorates:

- Governorate of Gabes over a distance of 82 km in the delegations of Gabes Ouest, Ouedhref, El Hamma, Metouia and Menzel Habib;
- Governorate of Gafsa over a distance of 58 km passing through the delegations of Belkhir, El Guettar and Mdhilla.

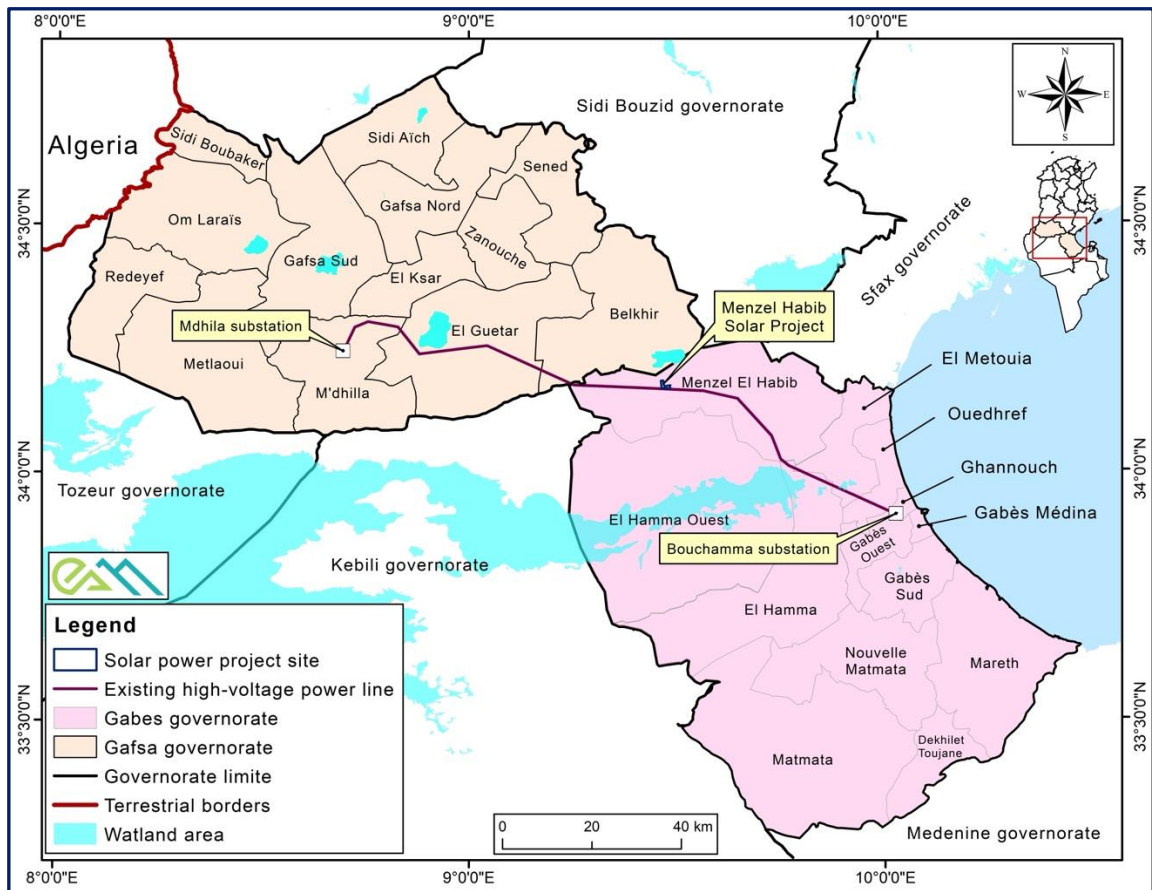


Figure 2.2 - Administrative map of the existing 150 kV transmission line Bouchamma and Mdhilla



Figure 2.3 - Photo of the 150 kV transmission line in the Southern sector of the solar PV plant

2.2 Existing infrastructure and vicinity of the PV site

The immediate vicinity of the solar PV plant is surrounded on all four sides (north, east, west and south) by agricultural plots with olive tree plantations located to the extensive lands used for formal grazing activities.

The vicinity of the solar PV plant is provided below:

- North:
 - o El Mehamla village is located approximately 2.3 km from the site. The village includes a school, a healthcare center, and a mosque
 - o Sebkhet Sidi Mansour approximately 3.2 km away
- Est of the Site: agricultural activities (land used for olive trees)
- South of the solar PV site (approximately 200 m):
 - o Railway line for the transport of phosphate from Gafsa to Gabes. It runs along the southern part of the site for approximately 1.9 km. It is built on an embankment, with a height exceeding three metres in some places. Several level crossings have been built to allow cars and pedestrians access. Hydraulic structures have also been installed under the railway line. It is important to note that, although several level crossings exist in the vicinity, none are located within the boundaries of the solar PV plant. Similarly, no hydraulic infrastructure is present on the site, and the project will not involve any modifications to existing hydraulic structures
 - o A seasonal dry Oued runs near the southern part of the site
 - o Existing 150 kV transmission line (140 km) linking Bouchamma to Mdhilla.

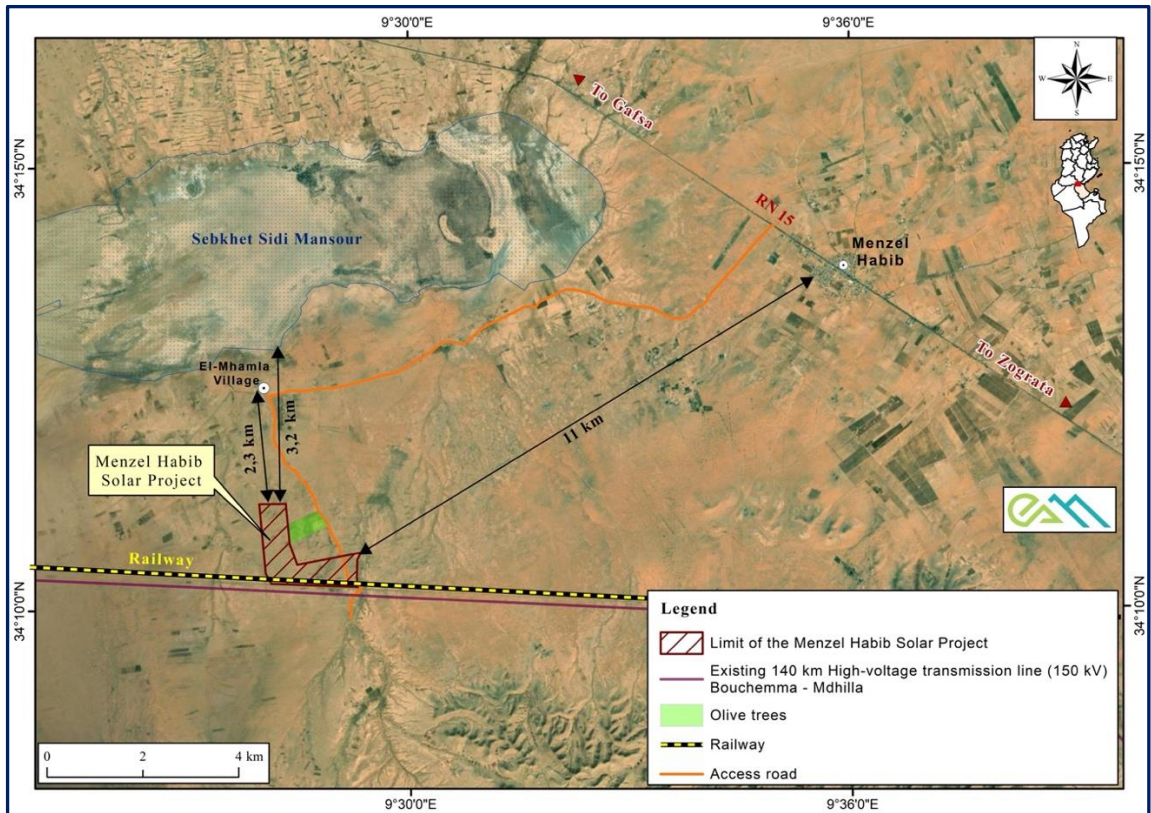


Figure 2.4 - Vicinity of the PV solar plant

The existing infrastructures and road connections are illustrated below:



Figure 2.5 - Transmission line Bouchama – Mdhilla (150 kV) and railway located south of the solar PV plant



Figure 2.6 - Railway line connecting Gabes to Gafsa for the transport of phosphate

2.3 Description of the Project components

2.3.1 Solar PV Plant 200 m transmission line location

PV solar cells convert solar energy (radiation from the sun) into electricity using semiconductors (photovoltaic material that exhibit the photovoltaic effect); following the exposure of the PV panel to light, voltage is created in the material as photons from sunlight excite electrons in those materials into a higher state of energy, allowing them to act as charge carrier for an electric current. Solar cells produce Direct Current (DC) electricity from sun light, which can be used for grid connected power generation. However, electricity at the grid is usually in a different form (known as Alternating Current (AC)) and thus inverters are used to convert the DC current to AC current. In addition, cells produce electricity at a certain voltage which must be matched to the grid it connects to. Therefore, transformers are used to convert the output from the panels to a higher voltage that matches the grid.

The table below provides a summary of the key project components for the 130 MWp Project, along with a detailed description of each of those components to follow. It is important to note that following information is based on preliminary data and design details provided by the Developer.

Table 2.1 - Main components of the solar PV plant

Component	Description
Project Generation Capacity	130 MWp
Project area	200 hectares (175 hectares for the PV Plant)
Module	Panel type: N-type TOP with double-sided double glazing Number of panels: 183,120 Power: 710W
Table	Modules per table: 28 Number of tables: 6,540
Tracking system	Single-axis tracker with a tilt angle of up to 60°. Tracker structures: Single row with single axis. Piles approximately 1.5 m deep
Transformer station	Type: TS9000-EL MV STATION Number of transformers: 14 Power: 9000 kVA
Inverters	Type: TS360KTL-HV-C1-V2. Number of inverters: 336 Power: 360 kVA

Component	Description
	The trenches for the DC cables will be dug to a depth of 700 mm below ground level, in accordance with IEC 60364-5-52.
Substation (on site) 33/225 kV	The substation comprises a high-voltage circuit breaker, two high-voltage/medium-voltage transformers, a medium-voltage switch room comprising a medium-voltage feeder relay, a control building, auxiliary medium-voltage/low-voltage transformers and a diesel generator set for emergency power, as well as all associated equipment.
Utilities	Warehouse and maintenance workshop Administrative building 15 m ³ drinking water tank
Connection to the solar PV plant	The electrical energy produced by the solar PV plant will be evacuated via a connection to the existing Bouchamma–Mdhilla transmission line, via a new transmission line of 200 m and using a LILO (Loop-In Loop-Out) connection. To ensure efficient energy evacuation, this existing line will be reinforced and upgraded to a voltage of 225 kV

*At the time of purchase, more efficient modules may be available, in which case the total number of modules may be reduced, and consequently the number of tables and trackers will also be reduced.

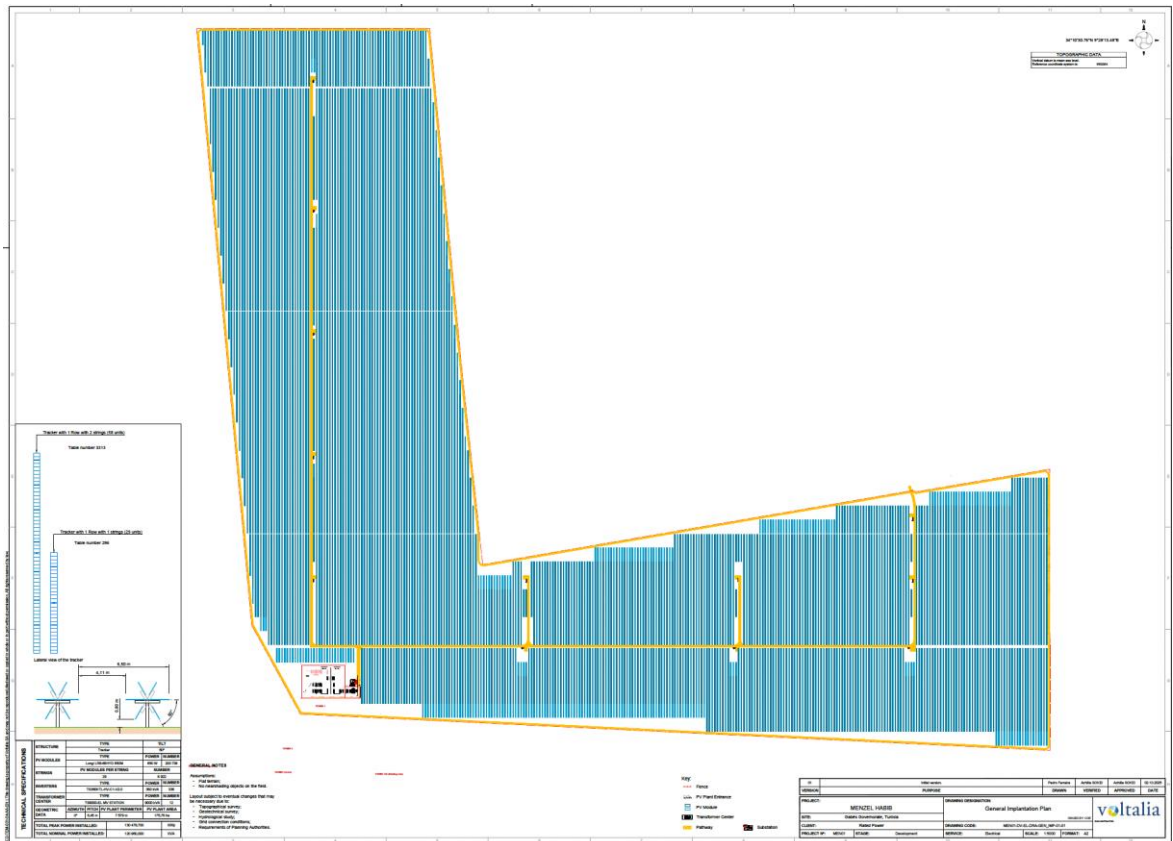


Figure 2.7- Layout plan for the 175-hectares of the solar PV plant

a) PV panels:

These are monocrystalline or polycrystalline photovoltaic modules that use silicon as a semiconductor material for electricity generation. Silicon is considered a non-hazardous material. Based on the preliminary design details available, the project will be divided into blocks consisting of photovoltaic panels (the typical structure of the panels is shown in the figure below).



Figure 2.8 - Example of rows of PV panels

b) Trackers:

The panels are mounted on motorised structures (trackers) that tilt them according to the position of the sun in the sky in order to maximise the amount of energy produced by the photovoltaic cells.

c) Inverters

The photovoltaic panels are grouped into strings and connected to a central inverter station, which converts the direct current (DC) generated by the photovoltaic panels into alternating current (AC).

d) Transformers:

Transformers raise the voltage in accordance with local transmission system operator recommendations. They also control the energy produced. In addition to current and voltage measuring devices, they are equipped with decoupling devices (circuit breakers) and protection against surges caused by lightning (lightning arresters).

e) Delivery substation :

The delivery substation will be the boundary between the electricity network operator and the PV plant operator. It allows all the power from the PV plant to be consolidated. It contains protection devices for the PV plant and the electricity network. It also contains the monitoring devices for the PV plant and the network operator (STEG).

f) PV plant electrical networks :

The project requires the construction of a network of trenches between the panels, the transformer stations and the delivery station. These trenches contain the cables for transporting the energy produced and the earthing network.

g) Grounding network:

The grounding network consists of copper cables that provide grounding for metallic structures, establish the neutral system and dissipate any lightning discharges.

h) Building:

Onsite building infrastructure will mostly include offices and a car park, a control building, maintenance warehouse, and a workshop for storage of equipment and machinery.

i) Access road and Internal road network:

The solar PV plant is accessible via two tracks from an unclassified road. These tracks currently

exist and one of them can serve as access routes for vehicles and equipment. No new access roads are planned, although minor upgrades may be carried out if necessary to facilitate transportation during construction.

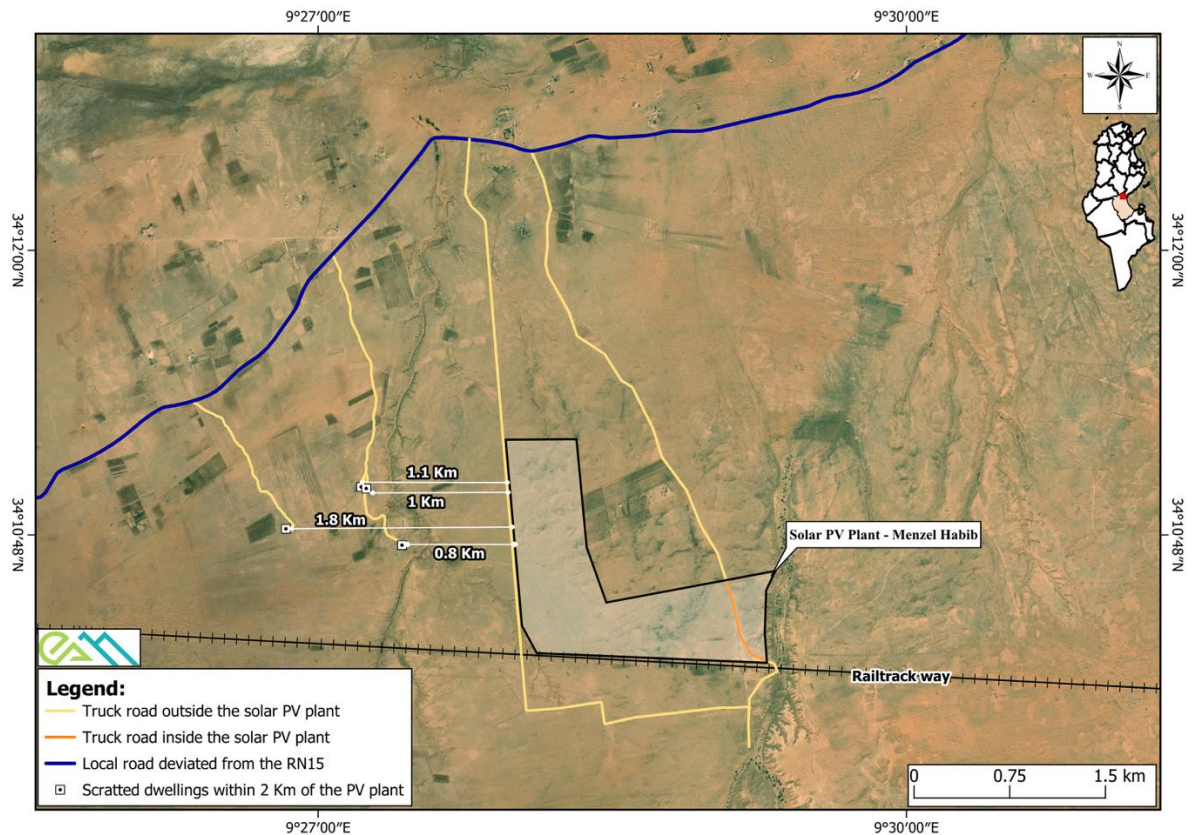


Figure 2.1 Access map

An internal road network will be established to facilitate access to the plant for operational and maintenance purposes a security road around the perimeter of the Project site for security patrols.

j) Surveillance system:

A fence will be installed around the entire facility to ensure security against unauthorized personnel. The fence will not be a solid wall; it will be a fence with wire mesh allowing wildlife to pass through. Remote cameras and automatic night lighting will also be used to enhance security.

k) Water supply:

The project’s water supply will be provided either through the drilling of an onsite borehole, subject to CRDA authorization, or through the construction of a large-capacity storage tank with water delivered by road tankers. During the construction phase, water will primarily be used for cement mixing and workforce needs, while during the operational phase, demand will be limited to staff consumption and fire-fighting purposes. To further reduce pressure on local water resources, a dry-cleaning method will be implemented for the photovoltaic panels, thereby eliminating the need for water in maintenance activities. While DGRE (2015), data indicated that the Menzel Habib shallow aquifer and the Sidi Mansour Cretaceous deep aquifer were underexploited (44% and 37% respectively), it is acknowledged that these data are nearly 10 years old and that the region has experienced prolonged drought over the past 10 years, which may have affected water availability. No site-specific hydrogeological study has been carried out to date; however, any borehole development will be strictly subject to CRDA authorization, which will assess the current capacity and sustainability of the aquifer before permitting abstraction.

1) Associated installation

The electrical energy produced by the solar PV plant will be evacuated via a connection to the existing 150 kV transmission line linking Bouchemma to Mdhilla (140 km), via a new 225 kV transmission line of 200 m and using a LILO (Loop-In Loop-Out) connection. To ensure efficient energy evacuation, the existing 150 kV transmission line linking Bouchemma to Mdhilla (140 km) will be reinforced. The Developer will carry out upgrading works to increase the nominal voltage of the transmission line from 150 kV to 225 kV. This upgrade involves replacing the existing glass insulators with composite insulators designed for the new 225 kV voltage and upgraded to a voltage of 225 kV.

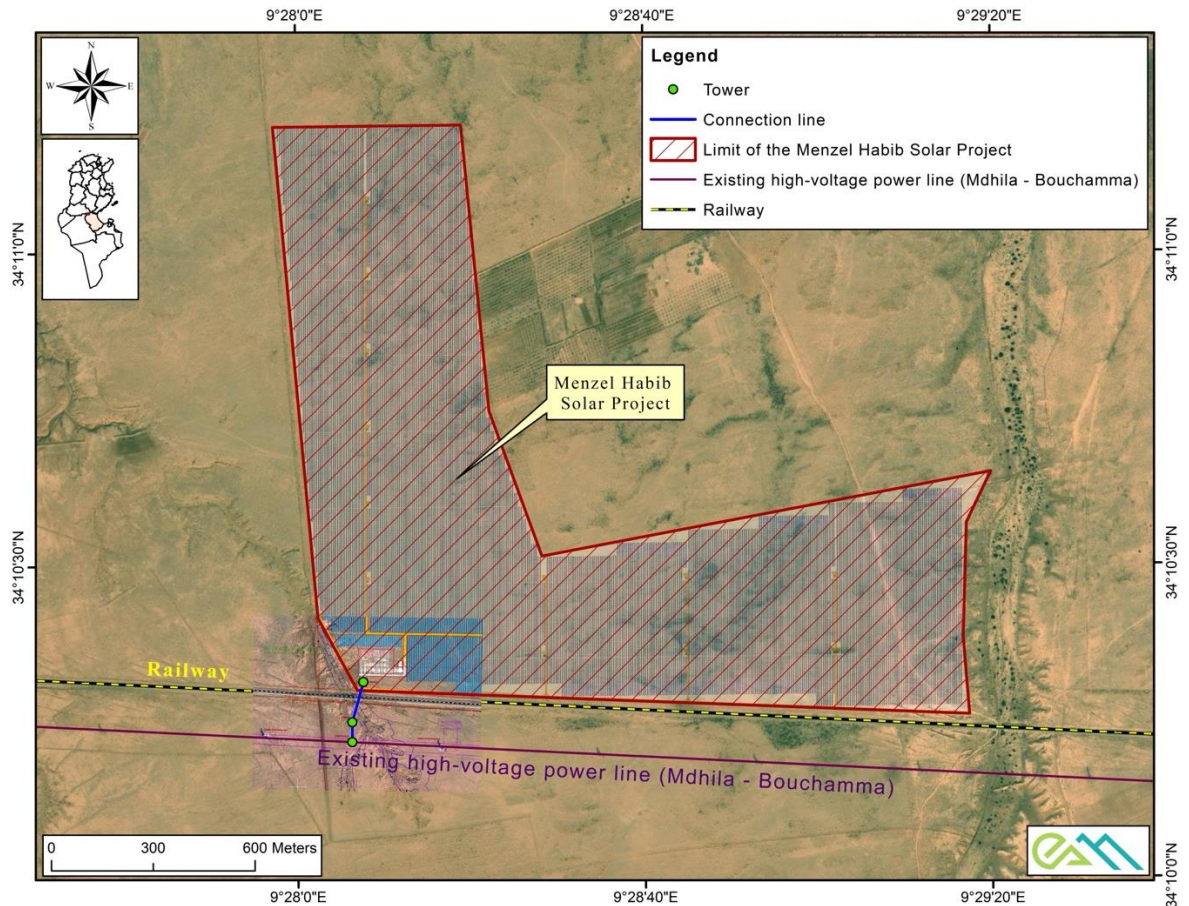


Figure 2.2 Connection of the Solar PV Plant to the 150 kV existing Transmission Line linking Bouchemma to Mdhilla via a new 225 kV transmission line of 200 m

2.3.2 Dimensions of the new 225 kV transmission line (200 m)

The estimated number of pylons is 3 along the 200 m of the transmission line. The footprint of the pylons is between 120 and 400 m² each as this depends upon the final type and size of pylon used. The pylon locations will be installed on a private land leased to the same landowner of the solar PV plant under a willing lessee, willing lessor arrangement and no expropriation is required. It should be noted that the transmission line will be designed and constructed by the Developer through an EPC contractor, and subsequently operated by STEG. Construction of the transmission line will comply with STEG’s design criteria for minimum spacing :

(i) Minimum above-ground heights

Description by category		Minimum height to be respected above ground- 225 kV
Ordinary terrain (ground surface)		8m
Crossings of roads accessible to vehicles	Common road	9m
	High-traffic Road	10 m
Other crossings	Plantations (olive trees, citrus trees, etc.)	9 m
	Railway lines	11 m
	Telecommunication line	5 m
	HTM transport / HTA transmission line	-
	HTB transport / HTB transmission line	-

(ii) Minimum distances from houses / dwellings:

The horizontal distance from the line axis to any dwelling must be at least equal to the values specified by STEG standards and the EBRD requirements. It should be noted that the minimum distance to be applied must take the more conservative value, which in this case corresponds to the EBRD requirement of maintaining a 30 m.

Designations	Distance to be maintained on each side of the TL as per STEG	Minimum distance to dwellings on each side	Minimum distance to be considered as per EBRD
Immediate vicinity of conductors	25 m	14 m	30 m*
Immediate vicinity of pylons	Height of pylon		

Note: A distance of 30 m is measured from the wall of a fenced or enclosed area, or from a building. Any other type of barrier, including vegetation fences or natural hedges, will not be considered.

For the new transmission line of 225 kV, STEG designed the alignment with an optimal right-of-way of 25 meters, which can be reduced to a minimum of 14 meters during construction activities.

It is important to note that the alignment of the transmission line was carefully selected to avoid any dwellings. No habitation is in the vicinity of the line.

(iii) Minimum distances between pylons and roads

- A minimum distance of 40 m between the pylons and the axes of agricultural roads.
- A minimum distance of 50 m between the pylons and the axes of the classified roads.
- A minimum distance of 65 m between the pylons and the axes of the highway.
- A minimum distance of 200 m between pylons and road intersections.

For safety reasons during the unrolling works, the constructor must locate the anchoring pylons at a distance $(d) \geq 150$ m from classified roads.

(iv) Minimum distances between pylons and Railway lines

- A minimum distance of 30 m between the pylons and Railway lines.

(v) Right of Way

- Electricity transmission and distribution projects require a RoW to protect the system from windfall, contact with trees, branches, utilities, buildings, and other potential hazards that may

result in damage to the system, or power failures, and to maintain public safety.

- The minimum distance to be respected from the immediate vicinity of conductors is 30 m on each side. It is important to highlight that STEG requires a distance of 25 m and tolerate a minimum distance of 14 m for a 225 kV transmission line.

2.3.3 Description of the upgrading works for the existing 150 kV transmission line (140 km)

The Developer will carry out upgrading works to increase the nominal voltage of the transmission line from 150 kV to 225 kV. This upgrade involves replacing the existing glass insulators with composite insulators designed for the new 225 kV voltage. In accordance with STEG standards for 225 kV transmission lines, a legal right-of-way (RoW) must be maintained, with a minimum distance of 14 m measured from the line axis to the nearest part of any dwelling.

It should be noted that STEG will remain responsible for operating the line.

The upgrading of the existing line is scheduled to take place over a period of one to two months, between October 2026 and March 2027. The works will primarily involve replacing the glass insulators with appropriate composite insulators, using a cherry picker.

The main activities planned are as follows:

- Inspection of the pylons.
- Dismantling of existing insulators without altering the main structures.
- Installation of new composite insulators designed for 225 kV lines.
- Electrical compliance tests: post-intervention tests to validate the line's performance at the new nominal voltage.

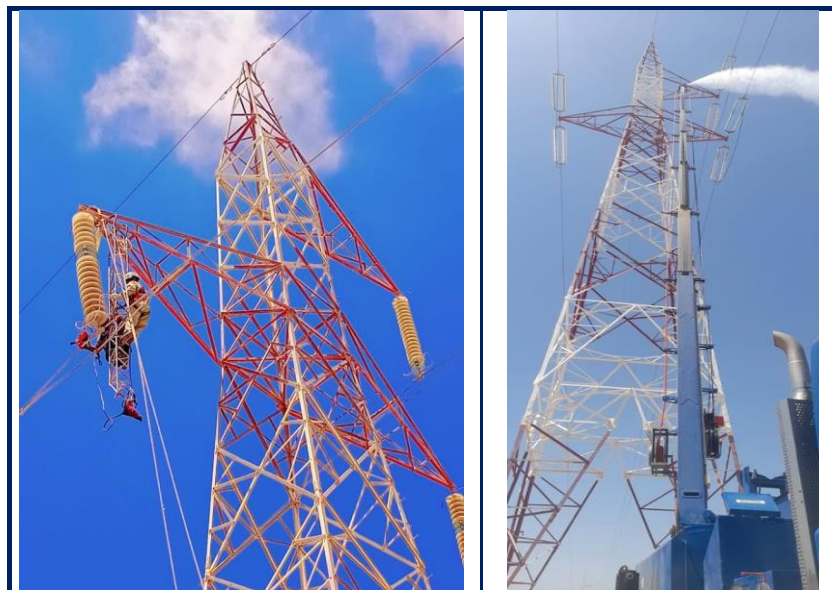


Figure 2.3 - Work on pylons for safe access to the insulators (photos from STEG)

2.4 Summary of project activities

The project will be developed in a three-phase sequence:

- Planning and construction phase (18 months for construction)
- Operational phase (25 years)
- Decommissioning phase

2.4.1 Planning and construction phase

This includes preparing the detailed design and layout of the Project, transportation of Project components onsite, as well as site preparation and construction activities for installation of PV

modules, inverter stations, substation, internal access roads, office and warehouse, new 225 kV transmission line, etc.

Construction phase of project activities will include the following:

- Contractor mobilization;
- Site Preparation including fencing, site clearing levelling and grading (no ground levelling will be required);
- Transportation of project components. All PV panels, electrical and structural equipment is planned to be shipped through sea or air to a seaport or airport and then trucked to site via road in containers;
- Construction of site office and internal roads;
- Construction of temporary storage facilities;
- Hydro-infrastructure;
- Foundation laying for ground mounted structures;
- Laying of internal electrical connections;
- Construction of sub-station and office buildings;
- Installation of inverter and transformers; and
- Commissioning tests which usually involve standard electrical tests for the electrical infrastructure as well as the panels, and inspection of routine civil engineering quality records. Careful testing at this stage is vital if a good quality PV farm is to be delivered and maintained.

Construction activities are scheduled to begin in January 2026, with a construction phase lasting 18 months. Based on the Developer similar project, the peak workforce during construction is expected to be 450 and comprise skilled employees (EPC contractor) and unskilled workers to be recruited from the local community.

The non-local workforce will be accommodated in a worker camp, or hotel facility in the region. The type and location of the facility used will be determined by the EPC contractor.

2.4.2 Operational phase

This includes activities to be undertaken by the Project Operator (local company established by Voltaia). Activities expected to take place mainly include the normal daily operation of the PV Plant and the routine maintenance activities of the PV Project (e.g. PV module cleaning, inverter servicing, checks on structural integrity, storage and disposal of broken PV panels, etc.). Commercial operation of the Project is expected to commence in June 2027 and continue for a period of 25 years according to the Power Purchase Agreement (PPA), after which the project will be handed over to STEG.

Operation and Maintenance (O&M) activities of the PV Project include:

- Monitoring, Maintenance, Inventory management, Administration warranties, Spare parts, Safety equipment and storage, Ensuring site security, Implementation, and follow-up of the ESHS plan.
- The solar project will require a dedicated O&M team comprising of technical staff to conduct the O&M activities.

The workforce for the operational stage is expected to comprise 10 people, mostly skilled roles.

2.4.3 Decommissioning phase

After 25 years, the project is expected to be transferred to STEG, who will own the Project and be responsible for the next steps which may include rehabilitation of the site and replacement of the panels, complete decommissioning, or another option.

2.5 Human resources for the solar PV plant

In terms of human resources, the construction of the solar PV plant will require approximately 450 people (350 unskilled workers and 100 skilled workers) for civil works and equipment installation. The operational phase will require the recruitment of around ten personnel to manage and operate the plant. The Developer aims to hire members of the local community as far as possible throughout the construction and operation phases for both skilled and unskilled jobs. The Developer is committed to adhering to transparent recruitment procedures that include local community members.

2.6 Land tenure and land use

The Solar PV plant and the new 225 kV transmission line (200 m) are located on private land covering 3 land titles totaling 200 hectares. The landowner, who holds all three titles, has voluntarily signed a lease promise agreement with the Developer, granting them exclusive use of the land.

The undeveloped land is currently used for herding activities by the landowner for his own livestock. The activities are carried out by his employees. Additionally, consultations with the landowner confirmed that no informal grazing activities are being conducted.

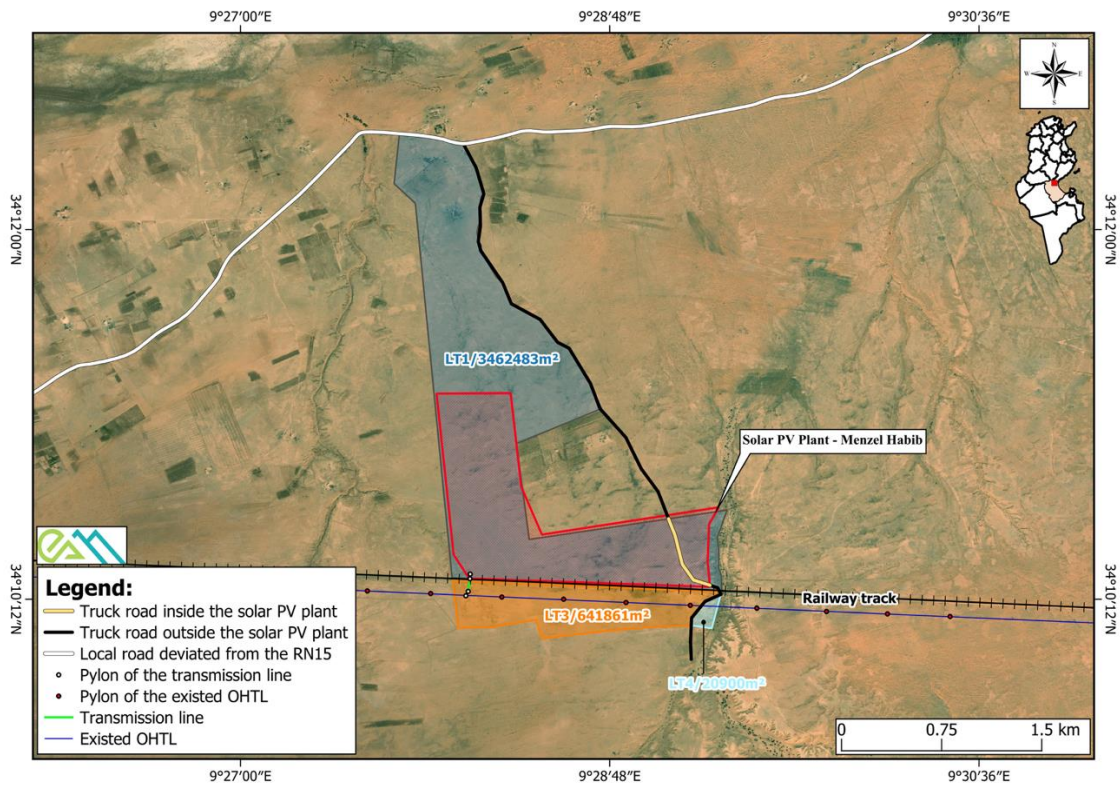


Figure 2.4 - Land titles of the solar PV plant and the new 225 kV transmission line (200 m)

2.7 Project Design and Resource Use Efficiency

The objective of this section is to demonstrate how the Project design has endeavoured to optimize the use of natural resources involved in the Project processes to the greatest extent possible. One of the key positive impacts of the Project is that it will be utilizing solar energy to produce electricity. The Project will be of an installed capacity of 130 MWp that will contribute to the national grid and reach end users and help meet the increasing electricity demands throughout Tunisia – as opposed to meeting such increasing demands through conventional electricity production from thermal power plants.

The Project is expected to provide around **200 Gigawatt Hour (GWh)** of electricity per year, which is enough to power around 97,000 households in Tunisia (based on average consumption of 2,000 kWh per household).

Tunisia is a signatory of the 2015 Paris Climate Agreement. The State is thus committed at the level of the Nationally Determined Contribution (NDC) to reduce its greenhouse gas emissions in all sectors to reduce its carbon intensity by 41% in 2030 compared to the 2010 base year. The reduction specifically targeted in 2030 for the energy sector is 46%. This reduction in carbon intensity is achieved through the use of renewable energy projects, which is framed by the Tunisian Solar Plan. The operation of a solar PV Plant in Menzel Habib with an installed capacity of 130 MWp will have a positive impact on air quality in general and is a means of combating global warming, as it is a clean energy production system that does not generate greenhouse gases during its operation, as well as other pollutant emissions (e.g. SO₂, NO₂, CO, etc.). The project will likely avoid more than **92,000 tons of CO₂ per year**. Thus, it will contribute to the reduction of GEG emissions by 0.45%, based on 26 million tons of GEG estimated in 2030 (Source: MALE, 2020).

Efficiency of Water Use:

The project's water requirements have been estimated in relation to the available resources of local aquifers. During the construction phase, the project will require a total of 5,500 m³ of water, which represents approximately 0.16% of the available resources of the shallow Menzel Habib aquifer (1,900,000 m³) and approximately 1.83% of the available resources of the deep Cretaceous Sidi Mansour aquifer. During operation, the photovoltaic modules will be cleaned regularly to prevent dust accumulation that could impair their performance, using a dry cleaning method. As a result, water consumption during operation will be approximately 10 m³/month, and a 15 m³ water tank will be used on site for drinking water. This represents less than 0.01% of the available resources of the shallow Menzel Habib aquifer (1,900,000 m³) and approximately 0.03% of the deep Cretaceous aquifer of Sidi Mansour (30,000 m³/year).

3.0 ESIA APPROACH AND METHODOLOGY

This chapter presents the approach and methodology undertaken for the ESIA study in accordance with applicable national and local regulations, the IFC's E&S Sustainability Policy (2012), and the EBRD's Environmental and Social Policy (ESP-2024).

3.1 *Definition of the project's area of influence*

In accordance with IFC Performance Standard 1 (PS1), when the project includes physical elements, material aspects, and facilities likely to generate impacts, the assessment of environmental and social risks and impacts must be determined at the scale of the project's area of influence. This area of influence includes, the direct physical footprint of the project, neighbouring areas that may be affected by its activities, and associated infrastructure, whether directly developed for the project or essential to its operation.

The area of influence covers, as appropriate:

- The area likely to be affected by: (i) the project and the activities, assets and facilities that are directly owned, operated or managed by the developer (including through contractors) and that form part of the project; (ii) the impacts of unforeseen but foreseeable events caused by the project that may occur at a later date or at a different site; or (iii) the indirect impacts of the project on biodiversity or on the ecosystem services on which the affected communities depend for their livelihoods.
- Associated facilities are defined as facilities that are not financed under the project and would not have been built or expanded in the absence of the project and without which the project would not be viable.
- Areas potentially affected by cumulative impacts resulting from the combined effect on areas or resources used or directly affected by the project, other existing, planned, or reasonably defined development projects at the time of the risk and impact identification process.

The area of influence affected by the Project mainly includes:

- The solar PV plant and the new 225 kV transmission line cover an area of 200 hectares.
- The unpaved access road (approximately 4 km long from the RN15 to the solar PV plant).
- The existing 150 kV transmission line (140 km)

The areas of influence considered for each environment are illustrated in the chapters below.

3.1.1 Area of influence on the physical environment

For the baseline condition of the physical environment, the area of influence considered is as follows:

- The direct area of influence on the physical environment includes the perimeter of the Project, as defined above: the photovoltaic park, existing access road, the new transmission line of 200 m and upgrading of the existing 150 kV transmission line linking Bouchama to Mdhilla (140 km), including a 14 m right-of-way.
- The indirect area of influence of the project includes receptors that may be affected by the project, even if they are not located directly on its physical footprint. This includes, in particular, tracks and roads used for the transport of project components:
 - Air quality: 100 m on either side of all construction areas to take into account the use of mobile construction equipment and vehicles (PM, SO₂ and NO_x).
 - Noise: noise impact area (defined as the area where an increase in environmental noise levels due to the construction phase can be detected) - generally 250 m from operations:
 - Terrestrial environment: impacts on soil and land use are assessed within a radius of 100 m around the project perimeter.

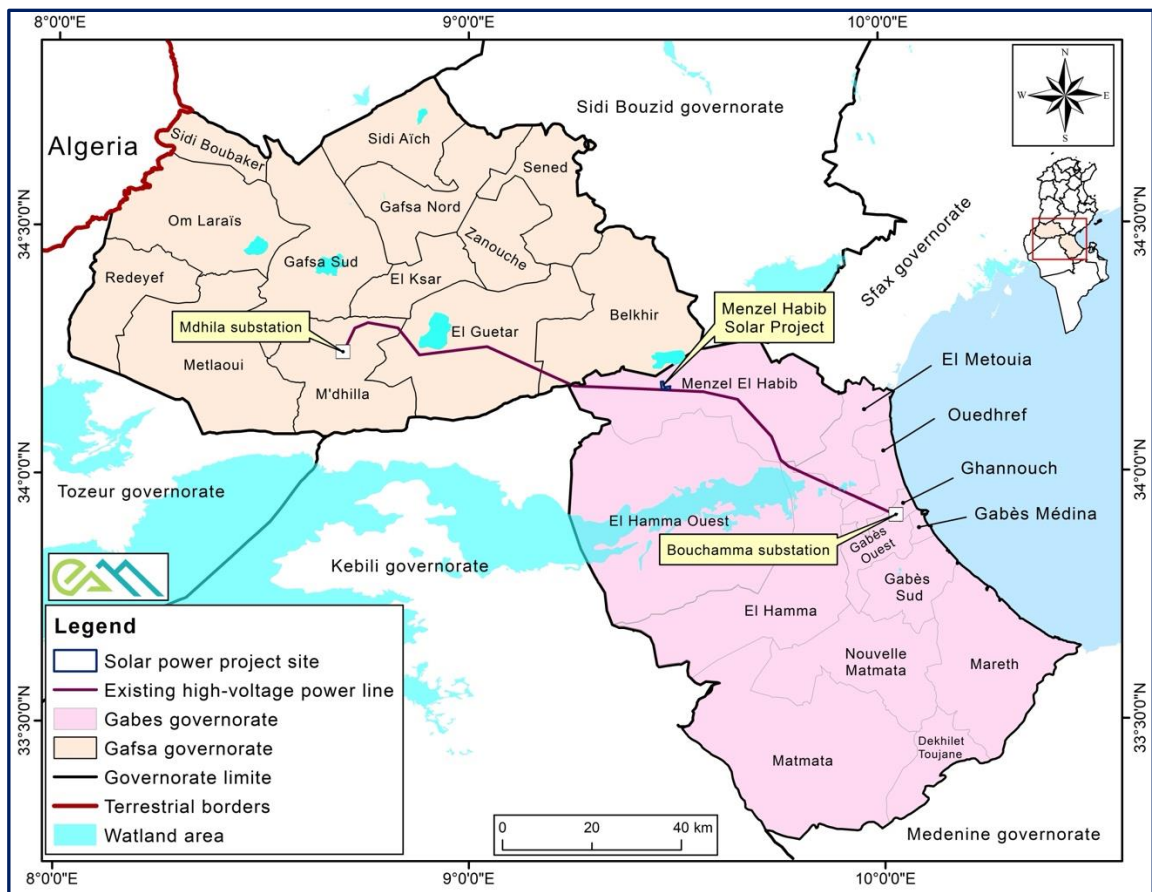


Figure 3.1 - Area of influence on physical environment including the solar PV plant, the new transmission line of 200 m and the existing 150 kV transmission line Bouchamma and Mdhilla

3.1.2 Area of influence on the biological environment

As part of the biological environmental study, two areas were defined in which inventories of flora, fauna and avifauna were established.

- The direct area of influence, which encompasses the solar PV plant, the new 225 kV transmission line and the access road, and the existing 150 kV transmission line linking Bouchamma to Mdhilla (140 km), which will be upgraded as part of the project, including a 14 m right-of-way.
- The extended area of influence includes the immediate surroundings of the project site and allows for the integration of issues present in the immediate vicinity of the work area, as well as the functionalities of certain species groups (particularly avifauna) within a 5 km radius. It should be noted that the extended area of influence for the biological environment includes Sebket Sidi Mansour.

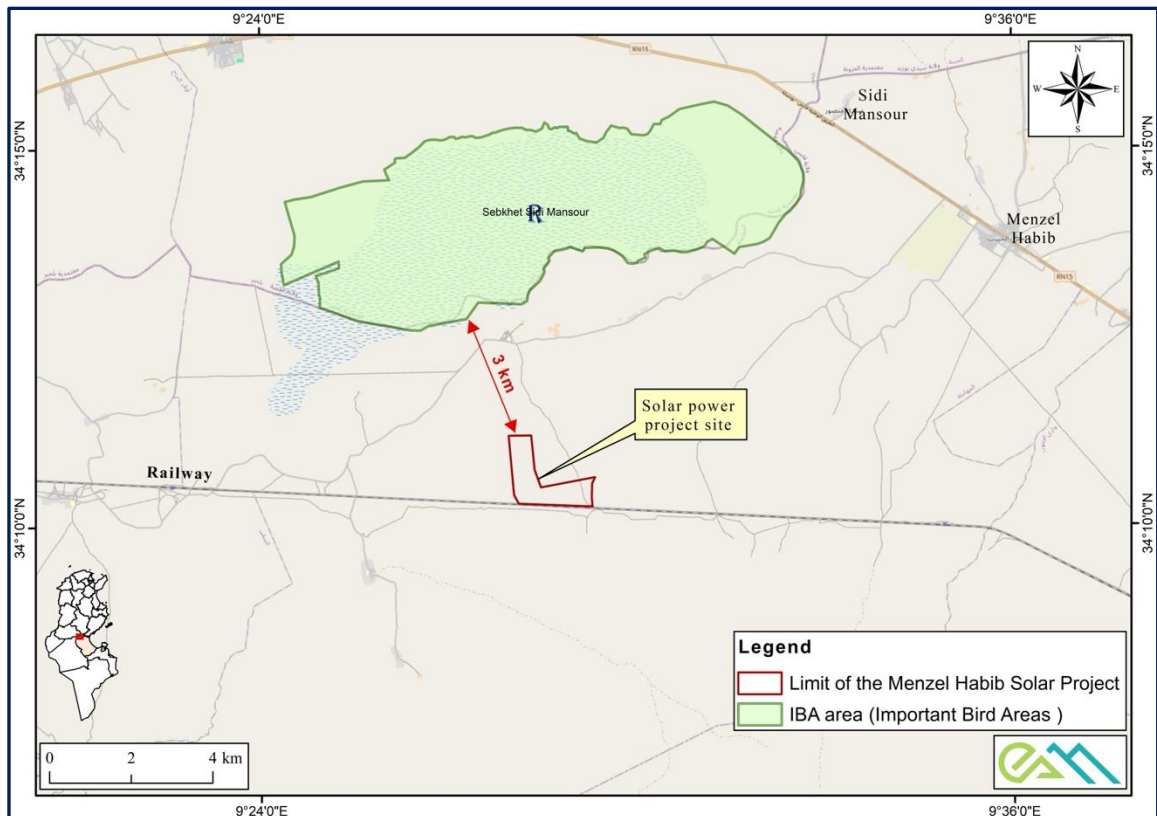


Figure 3.2 -Location map of Sebkheth Sidi Mansour (RAMSAR site)

3.1.3 Area of influence on the human environment

The affected communities have been identified based on a detailed understanding of the project site location and its administrative configuration. In order to understand all the social issues and sensitivities related to this project, two scales have been identified

- The direct area of influence includes villages located within a 3 km radius of the solar PV plant site. Only the village of El Mehmla is located within the area of influence (approximately 2.3 km away). It should be noted that El Mehmla has a population of 2,254, with economic activities mainly focused on agriculture, livestock farming and small-scale trade. The village includes a school, a healthcare center, and a mosque. In addition, it includes the existing structures located along the existing 150 kV transmission line linking Bouchama to Mdhilla (140 km), which lies within a 14 m right-of-way.
- The direct area of influence includes agricultural lands located in the immediate vicinity of the PV site
- The indirect zone of influence includes the Menzel Habib delegation and the Gabes governorate. Menzel Habib is located approximately 11 km away.

Consequently, the affected communities located within the project’s area of influence are expected to experience positive or negative impacts from the project, for example through: (i) employment opportunities available during the construction and operational phases, (ii) local procurement opportunities during the construction and operational phases, and (iii) potential community health and safety risks, such as the use of project vehicles on public roads, among others.

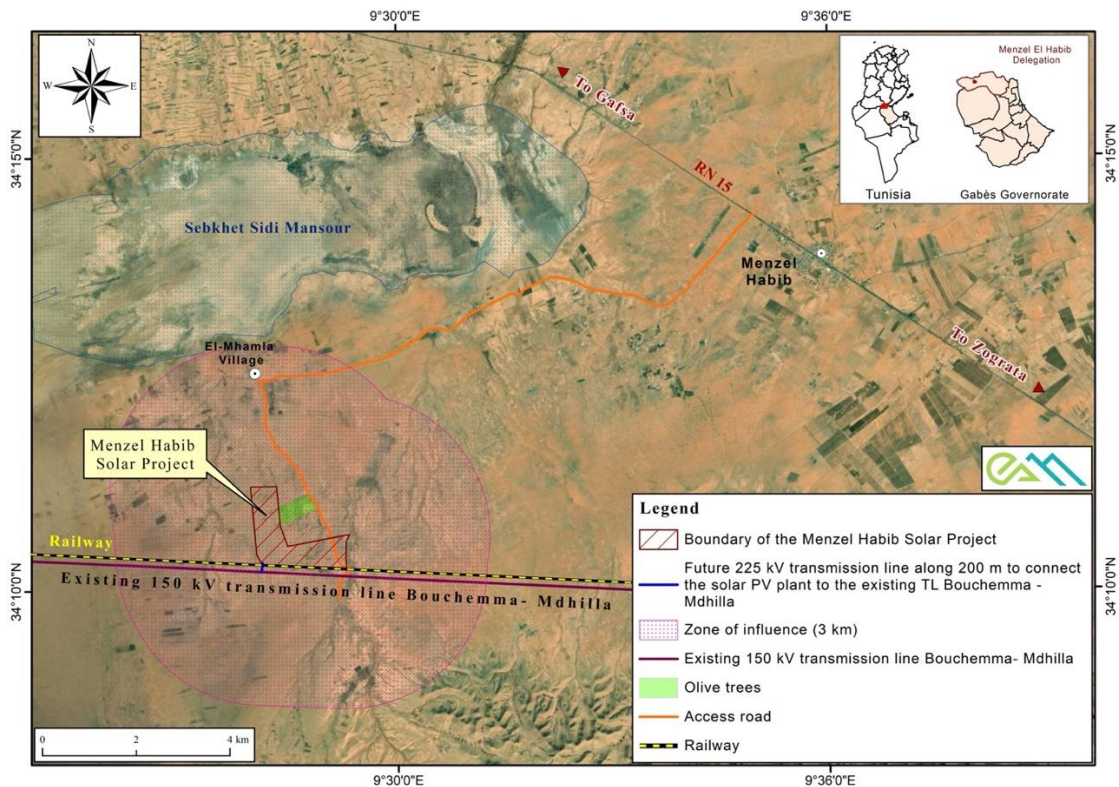


Figure 3.3 -Area of influence on human environment

3.2 Analysis of alternatives

This chapter analyses several alternatives to project development and the reasons for the preferred choice.

The review of alternatives is considered a key element of the ESIA process according to international best practice.

The analysis of alternatives is presented in the chapter "4.0 ". This chapter studies and compares several alternatives to the development of the Project in relation to: (i) the project site, (ii) the technology chosen for electricity generation, (iii) the project design, and (iv) finally, the "no action alternative" - which assumes that the project will not be developed. In addition, this section considers the promotion of renewable energy in Tunisia and the justification for the project.

3.3 Stakeholder consultation

Stakeholder consultation and engagement are an essential part of the ESIA process and have been carried out in accordance with IFC and EBRD requirements. Previous and future stakeholder consultation and engagement for the project are discussed in detail in the chapter "6.0"

3.4 Description of the state of the environment

The description of the initial state of environmental and social conditions is based on the following elements:

- A review of satellite imagery to identify sensitive receptors
- An analysis of literature and documentation concerning the study area.
- Field visits were conducted to assess the environmental and social conditions of the site. An initial mission focusing on biodiversity, the environment and archaeological heritage took place on 11 and 12 May 2023 as part of the preliminary environmental and social impact assessment. This enabled an initial characterisation of the site and its environment. A follow-up visit was then carried out on 14 February 2025, as part of the preparation of the ESIA report, to supplement the data on biodiversity, in particular fauna, flora and avifauna.

The description of the initial state of the environment is presented in "Chapter 7.0 " and includes:

- Description of the physical environment (geomorphology, geology, pedology, hydrology, hydrogeology, climatology, ambient air quality and noise levels).
- Definition of the biological environment (fauna, flora, avifauna and protected areas);
- Definition of the socio-economic environment (population, socio-economic activities, electrification rate, cultural and archaeological heritage, and landscape).
- Characterisation of existing infrastructure in terms of (i) sanitation infrastructure and services; (ii) wastewater treatment infrastructure and services; (iii) solid waste treatment infrastructure and services; (iv) hazardous waste treatment infrastructure and services; and (v) road networks.

3.5 *Approach to assessing the environmental and social impacts of the project*

To determine significance of the impact, the following parameters were considered:

- **The stage of the Project** when the impact is expected to occur (construction or operation or decommissioning). Most impacts are expected to occur during the construction stage.
- **The nature of the impact (positive, or negative)**, or if the impact has both positive and negative aspects which must be assessed individually.
- **The type of the impact**, including whether the impact is direct or indirect, and/or reversible or irreversible.
- **The duration of the impact** and whether the impact is temporary (few months), short-term (up to 2 years to reflect the duration of the construction stage), medium-term (between 2 to 5 years), long-term (5 years or more), or is permanent.
- **The extent of the impact** to reflect the expected change that may take place at a local level (PV site boundary and along the new 225 kV transmission line), regional level (delegation of Menzel Habib and the governorate of Gabes), a national level (Tunisia), or internationally.
- **The magnitude of the impact** which reflects the extent of change that is predicted to occur compared to the receptor's current status (described in Table 3.1).
- **The likelihood of the impact** occurring during the Project to the receptor, based upon the Project's activities and past experience from similar projects in rural and urban settings in Tunisia.
- **The sensitivity of the receptor** which reflects its ability to accommodate the predicted change and recover (described in Table 3.2).
- **Gender and vulnerability dynamics** to reflect the way in which impacts may be disproportionately experienced by women and/or vulnerable people.
- **Opportunities to describe the actions** that should be taken to maximum positive outcomes from the impact. Where an opportunity is identified.

The table below defines the impact magnitude:

Table 3.1 - Definitions for Impact Magnitude

Impact Magnitude	Criteria
High	A significant, permanent, and irreversible change to a receptors character, distinctiveness, or functionality which will not be acceptable to stakeholders, and/or breaches applicable regulatory standards.
Medium	A noticeable change to a receptors status that modifies its key characteristics, livelihoods or features of a receptor's character, distinctiveness, or functionality which requires detailed mitigation measures to be acceptable to stakeholders.
Low	A noticeable change which does not disrupt the receptors future character, distinctiveness, or functionality and will be mostly acceptable to stakeholders.

Impact Magnitude	Criteria
Negligible	Barely discernible change which does not disrupt the receptors future character, distinctiveness, or functionality.

Table 3.2 - Definitions for Receptor Sensitivity Classification

Receptor Sensitivity	Description
High	The receptor has a very low capacity to accommodate the predicted impact. The receptor has key characteristics which contribute significantly to the distinctiveness, and character of the receptor (e.g. community health, physical security, social cohesion, living standards, livelihood condition, mental well-being). The receptor has a low capacity to accommodate the predicted impact.
Medium	Receptor has key characteristics which contribute significantly to the distinctiveness and character of the receptor (e.g. very important to some households or businesses, but not all).
Low	The receptor has some tolerance to accommodate the predicted impact. Receptor only has characteristics which are important to few people.
Negligible	The receptor is robust from change and can accommodate the predicted impact. The receptor characteristics do not make a significant contribution to local socio-economic conditions, living standards or mental well-being.

The impact magnitude and the receptor sensitivity are combined to determine the significant of the impact and this is presented in Table 3.3. Impacts that are classified as being ‘Moderate’ and ‘Major’ are considered significant.

Table 3.3 - Impact Significance Matrix

Impact Magnitude	Receptor Sensitivity / Value			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Negligible
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Although the matrix above provides a method for assessing impact, a degree of professional judgement must be used, and certain parameter-specific factors must be considered in determining significance.

3.6 Mitigation and monitoring

An essential step in the ESIA process is to identify measures that can be taken to ensure that impacts are mitigated or reduced to acceptable levels. The ESIA will first examine the significance of any impacts caused by the Project and then assign mitigation measures using the following hierarchy:

- Avoid or "design out" impacts wherever possible;
- Consider alternatives or design modifications to reduce impacts as far as possible;
- Apply measures to minimise and manage impacts on the receptor; then, as a last resort;
- Identify equitable compensation, remediation and compensation measures to address any potentially significant residual effects.

Some negative impacts can be easily mitigated, while others cannot or are too difficult and costly to mitigate. The various potential impacts will be described in the ESIA, along with the "feasible mitigation measures" that can be implemented. In addition, for positive impacts, it is not possible to identify mitigation measures, but rather recommendations to enhance the positive impact.

Monitoring measures will also be identified and developed to ensure that the identified mitigation measures are taken into account, implemented correctly, and are sufficient for the protection of environmental and social receptors.

3.7 *Assessment of residual effects*

If mitigation measures exist, it is necessary to assess the 'residual significance' after taking the mitigation measures into account. The project's impacts will then be reassessed, taking into account the effect of the proposed mitigation measures, in order to determine the significance of the residual effects.

3.8 *Assessment of cumulative impacts*

For each of the impacts assessed, the ESIA considers the cumulative impacts that could result from the additional impacts of other existing and/or planned developments in the area, within a 20 km radius of the project site based on currently available information on these developments. The impact assessment and mitigation measures are presented in the "8.5 " chapter.

3.9 *Environmental and Social Management Plan (ESMP)*

Based on the results of the impact assessment, the development of mitigation measures and the monitoring plan, an ESMP has been compiled in the form of a single table detailing all of the elements mentioned above. The ESMP is a key document that consolidates environmental requirements and details the procedures necessary to manage significant environmental issues associated with the proposed project activities. The ESMP also includes the identification and definition of the roles and responsibilities of all entities involved in the implementation of the ESMP. The ESMP is designed specifically to provide flexibility in the exact nature and location of operations, while ensuring that all potential impacts are identified and properly mitigated and monitored throughout the subsequent stages of the project. This ESMP can be used as a stand-alone document during the various phases of the project by the developer, EPC contractor, project operator and other responsible parties.

4.0 ALTERNATIVE ANALYSIS

This chapter examines several alternatives to the project development and the reasons for the preferred choice.

4.1 *Promotion of renewable energy in Tunisia*

The Tunisian energy sector faces multiple challenges: strategic, economic, social and environmental. Energy supply, particularly for the electricity sector, is heavily dependent on natural gas (97% of the electricity produced), more than half of which comes from Algeria, given the country's limited domestic resources. As a result, the primary energy balance deficit has been steadily worsening for the past 15 years, reaching 50% in 2018. This energy dependence poses major challenges for Tunisia in terms of the security of its energy supply and the competitiveness of its economy. It should be noted in this context that the increase in energy imports to meet this deficit is increasingly affecting the national trade balance and the country's foreign exchange earnings. In order to address these challenges in the energy sector, the National Agency for Energy Management (ANME), operating under the supervision of the Ministry of Industry, Energy and Mines, was created in 1985 to implement the government's policy in the field of energy management, particularly promoting energy efficiency and renewable energies. In addition, to address this situation, Tunisia adopted an Energy Transition Strategy in 2014 based on the promotion of energy efficiency and the development of renewable energies, with the main objective of reducing the sector's dependence on fossil fuels and contributing to the decarbonisation of the sector. In line with this policy, the Developer proposes to develop a 130 MWp solar PV plant in the Menzel Habib delegation.

4.2 *Site selection*

Tunisia has extremely favorable sunshine conditions and has vast open spaces that can accommodate large electricity generation capacities. The construction of solar PV plants will increase the country's production capacity and national electricity demand. The development of solar energy and increased energy efficiency will lead to a diversification of the energy mix and a reduction in dependence on and risks associated with the massive use of fossil fuels.

At the industrial level, these technologies are undergoing significant development: they therefore represent significant potential for the creation of new markets and are promising opportunities in terms of job creation, technology transfer and, consequently, economic and social development.

The justification for the choice of project site takes into account the technical, environmental, economic and social aspects of the project.

Several factors were considered to ensure that an optimal location was chosen for the development of this solar photovoltaic project, including:

- **Growing electricity demand in the study area:** Improving grid stability by reducing voltage drops.
- **Proximity to the existing 150 kV transmission line:** the solar PV plant is served by an existing 150 kV transmission line, which will be used to transmit the energy produced.
- **Good solar radiation:** The Menzel Habib region is characterised by average global solar radiation (GHI) ranging from 88.3 kWh/m² in December to 247 kWh/m² in July, with an annual average of 1,955 kWh/m² per year.
- **Proximity to the road network:** The project area is easily accessible via a side road off the RN15.
- **Distance from key sensitive receptors:** The project site is generally located at a reasonable distance from any key potential sensitive receptors, including community facilities, archaeological sites, sites of regional architectural cultural heritage, and biodiversity features etc.

- **Natural landscape of the site:** Solar PV plants require preferably flat and open land for the installation of the various project components, including PV panels. The project area is generally characterised by relatively flat surfaces, therefore, site preparation and earthworks should not be significant.

In this context, no specific alternatives to the chosen site have been considered by the Developer. However, it should be noted that a preliminary impact assessment was carried out in advance to ensure that there were no major environmental or social issues in the area concerned. The results of this assessment confirmed that the site chosen by the Developer is the most suitable for the development of a solar PV plant, both from a technical and environmental point of view.

4.3 *Technological Alternatives*

Alternative to wind technology

The use of photovoltaic (PV) technology is more suitable than wind power for this project. The project area benefits from abundant sunshine throughout the year, with an annual average of 1,955 kWh/m², which maximises the efficiency of the solar panels. In contrast, seasonal variations in wind can affect the efficiency of wind power installations, resulting in less predictable energy production. These factors make the photovoltaic power plant a more stable and efficient solution in terms of energy production and better suited to the specific characteristics of the site.

Alternative to thermal power plants

Composed mainly of thermal power plants, Tunisia's electricity generation fleet is the largest national consumer of natural gas. Given the decline in natural gas production (-36% over the period 2010-2018), the high dependence on hydrocarbons poses a serious threat to the security of electricity production. About 97% of electricity is produced from natural gas; the share of renewable energies has not exceeded 3%. In addition, thermal power plants are well known for their environmental impacts when compared to this Project and could include significantly higher water consumption, generation of air pollutants and greenhouse gas emissions, noise generation, etc. More importantly, such developments would not be in line with the national energy strategy which aims to secure the country's supply of electricity and the promotion of renewable energy, with the goal of achieving an electricity mix of 35% by 2030 and 50% by 2035. This will result in the establishment of a total functional electricity generation capacity from renewable energies of 4,850 MW by 2030 and 8,350 MW by 2035, based mainly on photovoltaic and wind power.

Alternative to concentrated solar power plants

This type of technology requires cooling of the heat conversion system and a supply of fossil fuel to maintain the heat transfer fluid at the right temperature. This has certain disadvantages, including complex construction, technological risk (fire or explosion due to the presence of gas) and high financial cost. The choice of a photovoltaic installation remains justified due to the use of proven technology and very limited maintenance requirements.

4.4 *Site alternatives*

One of the objectives of this ESIA is to identify all site-specific environmental and social constraints that must be considered by the Developer throughout the project planning and design phase. The identified constraints include:

- the need to minimise the risk of flooding in the southern part of the site, taking into account the local topography and natural drainage patterns; and maintaining a buffer of 60 m from limit of the Oued to the PV site.
- the need to avoid manoeuvring machinery in the immediate vicinity of the railway line crossing the site in order to preserve its integrity and the safety of railway operations; and the need to comply with physical restrictions related to the presence of a nearby bridge.

Taking these constraints into account, the initial development plan has been revised. Although the site covers a total area of 200 hectares, the usable area selected for the plant is now 175 hectares. The new layout completely avoids areas at risk of flooding and areas close to the railway line and the bridge.

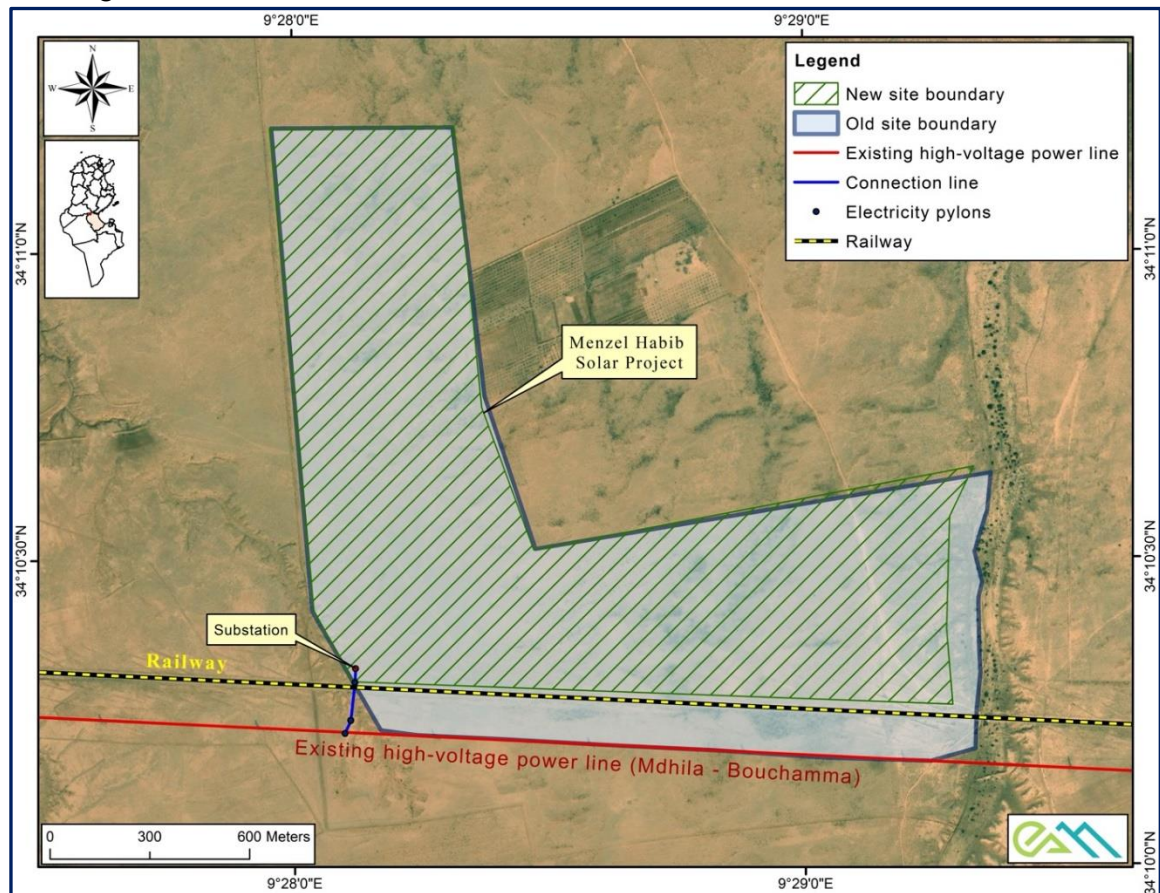


Figure 4.1 - Map showing the location of the project site

4.5 The « no project » alternative

The "no project" alternative assumes that the solar PV plant of Menzel Habib will not be developed. In this scenario, the area selected for the project would remain unchanged in terms of physical layout and land use. The site would retain its current characteristics as privately owned, undeveloped land used formally, mainly for extensive livestock grazing.

In this scenario, the potential negative environmental and social impacts described in this ESIA would be avoided. However, the environmental, energy and socio-economic benefits associated with the implementation of the project would not materialise. These benefits include:

- Contribution to national energy transition objectives, as part of Tunisia's strategy to increase the share of renewable energy to 35% by 2030 and 50% by 2035.
- Improving national energy security by diversifying the energy mix through the exploitation of a local, abundant and renewable resource, reducing dependence on hydrocarbon imports.
- Stimulating the local, regional and national economy through the purchase of goods and services from local SMEs, the creation of temporary jobs during the construction phase from local community and the creation of permanent jobs during the operational phase.

In the case of this project, it is important to weigh the significant positive impacts on the economy and the environment resulting from the development of the project against the negative environmental and social impacts expected at the specific site. The comparison clearly concludes that the "no project" alternative is not a preferable option.

5.0 LEGAL REQUIREMENTS

The purpose of this section is to outline the policy, legal and administrative context of the Project, including environmental and social and project approval requirements of the Bank and applicable regional/global conventions or agreements, as well as the applicable requirements from national legislation.

5.1 *Applicable national and local regulations*

5.1.1 Environmental and social requirements in Tunisia

Tunisian government decree 2016-1123 of 24 August 2016 stipulates that the production of energy from renewable sources requires the preparation of an environmental impact study, depending upon the capacity of the energy project. If required, this study must be prepared in accordance with the "Environmental Impact Assessment Guidelines" drawn up by the National Environmental Protection Agency (ANPE).

A preliminary environmental and social impact study was carried out in December 2023 as part of the call for tenders AO-01-2022, launched by the Tunisian government for the development of photovoltaic solar power generation projects.

On the basis of Decree no. 2005-1991 of 11 July 2005 on environmental impact assessment (EIA), which defines the categories of units subject to environmental impact assessment and the categories of units subject to specifications, only electricity generation units with a capacity of at least 300 MW are subject to EIA. Consequently, the solar PV plant of Menzel Habib which has a capacity of 130 MWp (less than 300 MW) **does not require an EIA**.

5.1.2 Institutional Framework

(i) Ministry of Industry, Energy and Mining

The energy and renewable energy sector are under the supervision of the Ministry of Industry, Energy and Mining. The mission of the Ministry is to develop and implement government policy in areas related to industry, agri-food industries, services related to industry, energy and mining, industrial cooperation and industrial, energy and mining security.

The National Agency for Energy Conservation (ANME): promotes of renewable energies, rational use of energy and energy substitution. ANME oversees the State's energy policy through the promotion of energy efficiency and support for renewable energies. ANME manages the Energy Transition Fund (FTE), which grants subsidies for investments to promote renewable energy and rational use of energy.

(ii) Institutions in charge of environmental and social issues

Many qualified institutions deal with the management and protection of the environment and social aspects. The institutions directly involved in this project are:

- ❖ **Ministry in charge of Environment (Ministry of Local Affairs and Environment:** in charge of the environmental policies of the State) and public institutions under supervision such as:
 1. **ANPE** oversees the application of regulatory texts relating to environmental protection, the examination of EIAs and specifications and ensures compliance with the related recommendations, environmental control and monitoring.
 2. **The National Waste Management Agency (ANGed):** oversees the following missions in particular:
 - Participate in the development of national waste management programs;
 - Helping to support and consolidate the regional groupings or structures that local authorities create in the field of sustainable management of facilities and controlled landfills;
 - Provide technical assistance to industrialists in the field of waste management;

- Manage public waste management systems (plastic packaging, lubricating oils and used oil filters, batteries, etc.);
- Promote waste recycling and recovery collection systems and programs.
- 3. **The National Sanitation Office (ONAS).** It was created under Law No. 73-74 dated August 3, 1974I and then restructured under the supervision of the Ministry of the Environment by Law No. 93-41 dated April 19, 1993. Its missions are as follows i) ensuring the production of treated water that complies with Tunisian specifications for reuse in agriculture; ii) ensuring the good quality of treated water remains stable; iii) Improve energy efficiency and guarantee treatment performance at the plants and iv) mainly to combat sources of water pollution.
- ❖ **Ministry of State Property and Land Affairs (MDEAF):** The MDEAF is responsible for the management control of movable and immovable property belonging to the State, regional and local public authorities and public establishments and enterprises; the allocation and disposal of State-owned immovable properties; the acquisition and expropriation of immovable properties for the benefit of the State and public administrative establishments, etc.
- ❖ **The Ministry of Agriculture,** notably
 1. **The Directorate General of Forestry (DGF),** whose mission is to ensure the protection and management of the State's forest estate, including national parks and nature reserves. At the regional level, the Ministry of Agriculture is represented in each governorate by a Regional Agricultural Development Commission (CRDA).
 - CRDAs could be involved in this project through their roles in the management and conservation of natural resources in accordance with the recast Forest Code (Law 88-20 of 13/04/1988) and its implementing decrees.
 2. **National Company of Exploitation and Distribution of Water (SONEDE)** is a Tunisian non-administrative public law company that provides drinking water throughout Tunisia. Created by law n°68-22 of 2 July 1968, it is placed under the supervision of the Ministry of Agriculture
- ❖ **Ministry of Culture, in particular the National Heritage Institute (INP)** which is responsible for preserving, safeguarding and restoring heritage; it could intervene in this project, if necessary, to collect and monitor information on discoveries related to archaeology and properties of an archaeological nature or to record and monitor the state of archaeological, historical and traditional heritage.
- ❖ **Ministry of Social Affairs:** Whose mission is to implement the social policy of the state aimed at ensuring balanced social development between different categories and generations of Tunisian society, consolidate social welfare in the areas of health, occupational safety, social security, promotion of vulnerable categories and special needs, adult education, supervision of the Tunisian community abroad and social housing. The Ministry draws up plans at the national, regional and sectoral levels, develops projects, ensures the participation of civil society, implements cooperation projects, supervises and assists in the promotion of communication and social information.

5.1.3 Local Regulatory and Legislative Framework

The legal framework established in Tunisia covers most aspects related to environmental protection, pollution control and improvement of the living environment.

Table 5.1 - Local regulatory and legislative framework

LAWS, DECREES AND ORDERS		LEGISLATIVE TEXT
RENEWABLE ENERGIES		
Decree No. 96-1125 of June 20, 1996		Setting the terms and conditions for granting electricity production concessions to private individuals
Law No. 2009-7 of February 9, 2009		Supplementing the law No. 2004-72 establishes the framework for the production of electricity from renewable energy sources for the own consumption of industrial, agricultural or tertiary establishments which benefit from the right of access to the STEG network for the transport of the electricity produced to their points of consumption as well as the right to sell their surpluses exclusively to STEG.
Decree No. 2009-2773 of September 28, 2009		Setting the conditions for access to the network and the transfer to STEG of surplus electricity produced from renewable energy sources within the limit of 30% of the production.
Decree of the Minister of Energy and Technology of May 12, 2011		Approving the specifications relating to the technical conditions for connecting and evacuating electrical energy from cogeneration and renewable energy installations to the national electricity grid.
Law No. 2015-12 of May 11, 2015		Defines the legal regime relating to the realization of projects of production and transport of electricity from renewable energy sources, either for self-consumption or to meet the needs of local consumption or for export.
Government Decree No. 2016-1123 of August 24, 2016		Setting the terms and conditions for the implementation of projects for the production and sale of electricity from renewable energies.
Order of the Minister of Energy, Mines and Renewable Energies dated February 09, 2017		Approving the specifications relating to the technical requirements of connection and evacuation of the energy produced from renewable energy installations connected on the high and medium voltage networks.
ENVIRONMENT AND PROTECTION OF NATURAL RESOURCES		
EIA Legislation	Law No. 88-91 of August 02, 1988	Creating the National Environmental Protection Agency (ANPE) and amended by Law No. 92-115 of November 30, 1992. This law introduced, in its Article 5, the obligation to carry out an environmental impact assessment (EIA) and to obtain the approval of the ANPE before the establishment of any industrial, agricultural or commercial unit whose activity presents risks of pollution or environmental degradation
	Decree No. 2005 - 1991 of July 11, 2005	Amending Decree No. 91-362 of March 13, 1991, on EIA. This decree specifies the content of the EIA and classifies the projects in three categories and lists them in two annexes; Annex 1 which concerns the projects submitted to the EIA, of category A (medium size projects) or category B (large projects) and Annex 2 which concerns the projects not submitted to the EIA, for small projects or those whose impact is deemed low, and which are subject to specifications.
	Law no. 2008-23 of April 1, 2008	According to Article 11 of this law, any unsolicited proposal to carry out an investment under a concession must be accompanied by a technical, environmental, economic and financial feasibility study.
	Decree No. 2016-1123 of August 24, 2016	Government Decree No. 2016-1123 of August 24, 2016 as amended and supplemented by Government Decree 2020-105 of February 25, 2020 setting the terms and conditions for the implementation of projects for the production and sale of electricity from renewable energies. According to article 30, the application for authorization must include, among the documents, an environmental impact study as required by current regulations. The content of the impact study is defined in the Procedures Manual drawn up by the Ministry of Energy, Mines and Renewable Energies in May 2017. It must include at least the following data: <ul style="list-style-type: none"> o A brief description of the initial site conditions. o A characterization of the site and a description of the surrounding areas (specifying whether or not there are sensitive areas, areas requiring special protection, etc.). o A summary assessment of the impact on flora and fauna, in particular on bird migration routes. o An assessment of the visual impact (integration of the project into its environment) and acoustic impact.

LAWS, DECREES AND ORDERS		LEGISLATIVE TEXT	
Water Code	Law no. 75-16 dated 31 March 1975, relating to the promulgation of the Water Code, as amended by Law no. 2001-116 dated 26 November 2001	The Water Code contains various dispositions managing, safeguarding and adding value to the public hydraulic domain. According to the terms of article 109 of this code, it is illegal to let flow, discharge, wastewater and waste or substances likely to harm public safety or the potential use of such waters. However, Article 113 authorizes the disposal of wastewater or sewage in filtering wells preceded by a septic tank.	
	Decree no. 2002-335 of 14 February 2002	Setting the threshold above which the consumption of water is subject to compulsory periodic technical diagnosis of equipment, works and production methods linked to the use of water, the conditions for appointing experts, the nature of the diagnosis and its frequency.	
Pollution Prevention Legislation	Liquid discharges	Decree No. 85-56 of January 2, 1985	Relating to the regulation of discharges into the receiving environment. This decree sets out the conditions for prohibiting and the procedures for authorizing discharges into the receiving environment. Any discharge into the public hydraulic domain is subject to the authorization of the “Bureau de la Planification et des Equilibres Hydrauliques (BPEH)” of the Ministry of Agriculture.
		Order of the Minister of Local Affairs and the Environment and the Minister of Industry and Small and Medium Enterprises of March 26, 2018, setting the limit values for effluent discharges into the receiving environment.	It repealed the order of the Minister of National Economy of July 20, 1989, approving the Tunisian Standard NT 106.02 which sets the conditions for effluent discharges into the water environment (public maritime domain, public hydraulic domain and public sanitation networks).
	Air emissions	Law no. 2007-34 dated 4 June 2007	Relating to the air quality
		Decree no. 2010-2519 dated 28 September 2010	Fixing the limit values of air pollutants from stationary sources.
		The government decree No. 2018-447 of May 18, 2018	Setting the limit values and alert thresholds for ambient air quality. This decree repealed the Order of the Minister of National Economy of December 28, 1994, approving the Tunisian standard NT 106.04 relating to limit values and guide-values of pollutants in ambient air.
	Disposal of solid waste	Law No. 96-41 of June 10, 1996	On waste and the control of its management and disposal: this law defined the specific framework for waste management and disposal methods as well as the provisions relating to: (i) the prevention and reduction of waste production at source; (ii) the recovery, recycling and reuse of waste; and (iii) the disposal of final waste in controlled landfills.
		Decree No. 2005-2317 of August 22, 2005	Creating a National Waste Management Agency (ANGed). According to article 4, the Agency prepares the specifications and the files of the authorizations relating to the management of waste provided for in the regulations in force and follows their execution. In addition, the Agency is in charge of following the registers and the notebooks that must be kept by the establishments and the companies, which proceed on a professional basis, to the collection, transport, elimination and recovery of waste for their account or for that of others.
		Decree no. 2005-3395 of December 26, 2005	Sets the conditions and procedures for the collection of used batteries and accumulators.
		Decree No. 2008-2565 of July 7, 2008	Amending and supplementing Decree No. 2002-693 of April 1, 2002, sets the conditions and procedures for the return of used lubricating oils and oil filters and their management.
	Management of waste and hazardous products	Circular of the Ministry of Commerce of May 12, 1987	Prohibiting the importation into Tunisia of transformers and all other equipment or products based on PCBs.
		The Law No. 96-41 of June 10, 1996	On waste and control of their management and disposal
		The Law No. 97-37 of June 02, 1997	Fixing the rules organizing the transport by road of dangerous materials in order to avoid the risks and the damages likely to reach the persons, the goods and the environment.

LAWS, DECREES AND ORDERS		LEGISLATIVE TEXT
		Decree No. 2000-2339 dated October 10, 2000
		Decree No. 2005-3079 of November 29, 2005
		Order of the Minister of the Environment and Sustainable Development dated March 23, 2006
		Order of the Minister of the Environment and Sustainable Development dated January 17, 2007
		Decree No. 2009-1064 of April 13, 2009
		Order of the President of the Municipality, Mayor of Tunis of August 22, 2000
Prevention of noise pollution	Neighborhood noise	Order of the President of the Municipality, Mayor of Tunis of August 22, 2000
	Noise emitted by motor vehicles	Highway Code
	Noise from industrial activities	Decree No. 84-1556 of December 29, 1984
	Noise in the workplace	Order of the Ministers of Public Health and Social Affairs establishing the list of occupational diseases of January 10, 1995.
Protection of agricultural land		Law No. 83-87 of November 11 th , 1983, relating to the protection of agricultural land.
		Decree no. 84-387 of 7 April 1984
		Decree no. 84-386 of 7 April 1984

LAWS, DECREES AND ORDERS		LEGISLATIVE TEXT
	Law No. 95-70 of July 17, 1995, Relating to the conservation of water and soil.	The purpose of this law is the conservation of areas threatened by water erosion, wind erosion and silting. Water and soil conservation works, carried out through anti-erosion actions, are implemented within the framework of intervention perimeters according to development plans
	Law No. 2001-119 of December 6, 2001.	The felling and uprooting of olive trees are forbidden unless authorization is issued by the governor, territorially competent, within a period not exceeding two months from the date of filing a duly constituted application at the headquarters of the governorate.
LAND TRANSPORT		
	Law 97-37 of June 2, 1997	Relating to the road transport of the dangerous matters, to prevent the risks and damages likely to affect persons, goods, and the environment.
	Decree no. 2002- 2015 of September 4, 2002	Fixing the technical rules relating to the equipment and layout of vehicles used for transporting hazardous materials by road.
	Decree no. 2007-4100 amending and supplementing decree no. 2005-3079 of November 29, 2005.	Fixing the list of hazardous materials which must be transported by road under the control and with the accompaniment of safety units.
BIODIVERSITY		
	<i>Biodiversity in Tunisia</i>	Biodiversity in Tunisia is related to 69 sets of natural ecosystems and 12 sets of agrosystems. A total of 7212 species including 3749 terrestrial plant and animal species and 3463 marine and aquatic plant and animal species have been identified. Tunisia is well engaged in all the processes of environmental and biodiversity protection and has ratified all related international conventions and agreements. Apart from these conventions, a legal arsenal has been put in place to preserve and protect biodiversity, the most important texts cited below:
	The Forestry Code, promulgated in 1966 and recast in 1988	As amended and supplemented by Law No. 2005-13 of January 26, 2005, constitutes the basic legal framework for the conservation of the natural environment (forests, estuaries, rangelands, forest land, national parks and nature reserves, wildlife, and wild flora) and the management of national parks. It stipulates that work and development projects can only be undertaken in areas governed by the Forestry Code after authorisation from the Minister of Agriculture. Among the provisions relating to National Parks, the Forestry Code: Prohibits or restricts all actions likely to hinder the natural development of fauna and flora, notably hunting, advertising and commercial activities, extraction of materials, use of water, public traffic, etc; Defines as serious and non-transactional, offences concerning protected wildlife committed in national parks.
	Law No. 92-72 of August 03, 1992	Recasting the legislation relating to plant protection, sets the general provisions for plant protection and the organization of the sector of pesticides for agricultural use.
	Order of the Minister of Agriculture of June 29, 2006	Setting the conditions for granting authorizations for temporary occupations in the State Forest estate, prohibits temporary authorization for any work that will have a negative impact and risks on the environment and natural resources in the forest estate, national parks, nature parks, wildlife protection areas.
	Order of the Minister of Agriculture and Water Resources of July 19, 2006	Establishing the list of rare and endangered wild fauna and flora.

LAWS, DECREES AND ORDERS	LEGISLATIVE TEXT
LAND OCCUPATION & ACQUISITION	
Temporary occupation and easement of passage: Decree of May 30, 1922	<p>Relating to the establishment, maintenance and operation of electric transmission lines.</p> <p>Allowing power line projects to cross private property (including agricultural land or land used for other productive purposes) without the need for land acquisition. There is therefore no transfer of ownership or expropriation to be carried out in connection with the power lines, neither at the line nor at the masts.</p> <p>Easements are compensable: when they cause damage to the land crossed, compensation must be paid.</p> <p>Compensation is paid to the operators of the land crossed, whether they own it. When a piece of land is owned by an owner but operated by another person, it is the latter who is entitled to receive compensation. The passage of a power line is prohibited through any fenced property overhanging existing buildings. Tunisian law thus de facto minimizes the impacts that a proposed line could have on physical movement by prohibiting it.</p> <p>In the framework of the right of easement, STEG concludes temporary occupation agreements with owners and/or farmers before the start of work. The same agreements are entered into with the owners and farmers using the land where the pylons will be installed, even if the occupation will be for a much longer period. These agreements give rise to the payment of compensation when crop damage occurs.</p>
Land acquisition: Tunisian law no. 76-85 of August 11, 1976, on expropriation for public interest, as amended by law no. 2003-26 of April 14, 2003, law no. 2016-53 of July 11, 2016, and decree-law no. 2022-65 of October 19, 2022.	<p>STEG favours state-owned land to avoid having to acquire land from a private owner.</p> <p>If the land is privately owned, STEG will negotiate amicably and will only resort to expropriation, governed by Tunisian law n°76-85 of August 11, 1976 relating to expropriation for public use, as amended by law n°2003-26 of April 14, 2003, law n°2016-53 of July 11, 2016 and decree-law n°2022-65 of October 19, 2022, when the owner opposes the purchase of his land.</p> <p>Expropriation for reasons of public utility (ECUP) is an administrative operation by which the administration obliges a private individual to transfer ownership of a building (land) to it, for a public utility purpose, and in return for the payment of fair and prior compensation.</p>
PROTECTION OF CULTURAL RESOURCES	
The Heritage Code: Law No. 94-35 of February 24, 1994	<p>On the protection of historic monuments and natural and urban sites) defines the regulatory provisions for safeguarding and protecting the archaeological, historic or traditional and cultural heritage integrated into the public domain of the State. It submits to the prior authorization of the minister in charge of heritage the works relating to the electrical networks undertaken within the safeguarded sectors, in the vicinity of historic monuments, within the limits of the perimeter of a cultural site. In addition, the Code requires, in case of accidental discoveries of remains, that the discoverer immediately informs the competent services of the Ministry in charge of Heritage which will take all necessary measures for the conservation and will ensure, if necessary, the supervision of the work in progress (Art. 68). In addition, the legal texts relating to public contracts include an article in the General Administrative Clauses (GACC) that defines the precautions and measures to be taken when work uncovers objects or remains of an archaeological or historical nature.</p>
GENDER AND ASSISTANCE TO THE VULNERABLE POPULATION	
<i>Gender-related legislation</i>	<p><i>With regard to gender equality, Tunisia's legal framework has developed rectifications and improvements over the last six decades, providing in many respects a protection of women's rights far more advanced than anywhere else in the region.</i></p> <p><i>The flagship texts of this legislative improvement are:</i></p>
Decree of August 18, 1958	Promulgating the Code of Personal Status (CSP): stipulating equal rights between the sexes regarding divorce, employment, business property and the banking sector: but also prohibiting polygamy, establishing a legal age of marriage at 18 for girls.
Law No. 85-68 of July 12, 1985	Ratifying the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) but with some reservations.

LAWS, DECREES AND ORDERS	LEGISLATIVE TEXT
Modifications of the CSP in the 90s (Decree No. 95-2680 of December 25, 1995)	Law No. 93-74 of July 12, 1993, Law No. 92-48 of May 04, 1992) then in the 2000s (Law No. 2008-20 of March 04, 2008, Law No. 2007-32 of May 14, 2007; Law no. 2006-10 of March 06, 2006 Law No. 2006-10 of March 06, 2006) allowed that women no longer have to obey their husbands, they have rights to pass on their citizenship to their children and they can receive alimony.
Decision of January 31, 2014	Ordering the publication of the Tunisian Constitution (new) Article 21: "All male and female citizens have the same rights and obligations. They are equal before the law without discrimination." Article 46: "The State undertakes to protect the acquired rights of women and seeks to consolidate and promote them. The State shall guarantee equal opportunities for men and women to have access to diverse responsibilities in all fields. The State endeavours to ensure parity between women and men in elected assemblies. The State will take the necessary measures to eliminate violence against women".
Withdrawal of reservations to the CEDAW Convention on April 17, 2014.	Marriage: Women do not have the right to act as "the head of the family." However, as of September 2017, the provision of the Nationality Act of Tunisia by which women could not confer Tunisian nationality on a foreign spouse and could not marry non-Muslims, was repealed Labour: Tunisian law does not specifically mandate equal pay for equal work, although there are generic non-discrimination provisions in the labour code and Tunisia ratified ILO Convention 100 on Equal Remuneration in 1968. Tunisia has also ratified ILO Convention No. 189 on Domestic Work (Decent Work for Domestic Workers) (need accurate data here and probably an expression explaining what this specifically commits Tunisia to undertake and its relationship to the domestic labour code).
Government Decree No. 2016-626 of May 25, 2016	Establishing the Peer Council for Equality and Equivalence of Opportunities between Women and Men.
Organic Law No. 2017-58 of August 11, 2017	On the elimination of violence against women. - The objective of this Act is to put in place the measures necessary to eliminate all forms of violence based on gender discrimination in order to ensure equality and respect for human dignity, according to a comprehensive approach focused on the fight against its different forms, through prevention, prosecution and repression of its perpetrators, and protection and care of victims.
Article 12 of the Tunisian Constitution	Article 12 "the State acts to ensure social justice, sustainable development and balance between regions, taking into account development indicators and the principle of positive discrimination "
HEALTH/SAFETY AND WORKING CONDITIONS (LEGISLATIVE TEXTS RELATING TO LABOUR PROTECTION AND WORKING CONDITIONS)	
Labour Code	Law no. 66-27 of April 30, 1966, promulgating the Labour Code and all the texts that have amended or supplemented it, in particular Law No. 96-62 of July 15, 1996 and Law No. 2007-19 of April 2, 2007. Article 79 of the Labour Code states that actual working hours may not exceed 48 hours per week 'or an equivalent limit established over a period of time other than a week, provided that the duration of this period does not exceed one year'.
Decree No. 75-240 of April 24, 1975, amending Decree No. 67-391 of November 6, 1967	Relating to the health, safety and employment of women and children in industrial and professional trade establishments.
Decree No. 68-328 of October 22, 1968	Establishing the general hygiene rules applicable in companies' subject to the Labour Code. Obligation to provide all employees with drinking water in easily accessible places, protected from all causes of pollution: - Obligation to post notices in plain view, when drinking water is intended for industrial operations or firefighting, near the supply stations, clearly indicating that the water in question is dangerous and must not be consumed. - Requirement that all waste receptacles be covered and constructed to be leak-proof and easily cleaned and disinfected. - Obligation to keep the work premises well ventilated (the air cubage must not be less than 7 m3 per employee). - Obligation to install sanitary installations in special rooms, isolated from the workshops but preferably placed on the workers' exit passage. All these rooms must be well ventilated and lit. - Obligation to have at least 1 washbasin for every 10 users. - Obligation to have at least 1 shower for 20 users.

LAWS, DECREES AND ORDERS		LEGISLATIVE TEXT
Decree No. 75-503 of July 28, 1975		Regulating measures for the protection of workers in establishments using electrical currents.
Law No. 87-31 of July 06, 1987		Ratifying the Arab Labour Convention No. 7 relating to occupational health and safety. The provisions relating to occupational safety and hygiene must include the technical rules necessary to ensure safety and protection, with regard to (i) the choice of the location of the establishment; (ii) design and construction; (iii) prevention against all occupational hazards; (iv) the legislation of each state determines the technical requirements necessary to comply with these rules.
Law No. 94-28 of February 21, 1994		On compensation for damages resulting from work accidents and occupational diseases) establishes a list of work-related diseases and the work and substances that may cause them (toxic substances, hydrocarbons, plastics, dust, infectious agents, etc.). It obliges the employer to declare the work processes likely to cause occupational diseases and the occupational physician to declare the occupational disease found, specifying the nature of the harmful agent. In this regard, Tunisia has also ratified most of the International Labour Organization (ILO) conventions (fundamental and technical).
Order of the Minister of Industry, Energy and SMEs of November 15, 2005		Establishing the nomenclature of dangerous, unhealthy, or inconvenient establishments as completed and amended by the Order of the Minister of Industry and Technology of February 23, 2010, and the Order of the Minister of Industry of October 24, 2012.
Decree No. 2006-2687 of October 09, 2006		Sets the conditions, terms and procedures for the opening and operation of dangerous, unhealthy, or inconvenient establishments.
Law No. 2009-11 of March 02, 2009		Promulgating the code for safety and prevention of fire, explosion and panic hazards in buildings
CONSULTATION AND DISCLOSURE OF INFORMATION		
Consultation and Access to Information in the National EIA System	Government Decree No. 328-2018 of March 29, 2018, on the organization of public consultation	In Tunisia, the terms and conditions of public consultation have been defined in Government Decree No. 328-2018 of March 29, 2018, on the organization of public consultation.
	The 2005-1991 decree	Relating to EIAs (not ESIA). It remains very general on social impacts and social management plan. The analysis of the vulnerable population or the gender aspect is not also required by this Decree.
	The Code of Land Use Planning, Urbanism and Construction (under preparation),	In its Article 22, provides for consultations of councils or commissions where the interested local populations and communities are represented, as well as the most representative socio-economic organizations and associations in the field under consideration in association with the State and local communities.
Access to Information	Decree-Law No. 2011-41 of May 26, 2011	Relating to access to administrative documents of public bodies: which specifies that these documents mainly concern the organization, manuals, list of employees, programs, etc
	Article 32 of the Tunisian Constitution (2014)	The State guarantees the right to information and the right of access to information.
	Organic Law No. 2016-22 of 24 March 2016	On the right of access to information, which defines the right of access to information related to programs and projects, benefits, financial information, etc. of public administrations. The ESIA is not clearly mentioned in the law but can be requested through an access to information form but is subject to acceptance or refusal by the competent authority. However, an appeal is possible to the national body of access to information created the above-mentioned law and functional since August 2017 by Government Decree No. 2017-918 of August 17, 2017, appointing members of the body of access to information.
	Constitution	Article 139 "Local governments shall adopt the mechanisms of participatory democracy and the principles of open governance in order to guarantee the broadest possible participation of citizens and civil society in the preparation of development and land use planning projects and the monitoring of their implementation, in accordance with the law". A public e-participation portal has been designed to respond to citizens' aspirations for greater involvement and commitment in the public decision-making process and the enshrinement of the principles of participatory democracy.

LAWS, DECREES AND ORDERS	LEGISLATIVE TEXT
URBANISM PLANNING	
Law n° 2009-29 dated 9 June 2009	Law n° 2009-29 dated 9 June 2009, amending and completing the territorial development and urbanism code.
ZONES BURDENED EASEMENT OF AIR TRAFFIC	
Decree n° 2007-1115 dated 7 May 2007	Fixing the zones burdened easement of air traffic for clearance and marking relating to airfields intended for public air traffic and for some restrictly used airfields.
CORPORATE SOCIAL RESPONSIBILITY (CSR)	
Law no. 2018-35	Law no. 2018-35 on Corporate Social Responsibility (CSR). A regional commission is created to define the priorities of intervention.
INCENTIVES FOR INVESTORS	
Government Decree No. 2017-389 of March 9, 2017,	Decree on financial incentives for investments made under the investment law. With an investment cost greater than or equal to fifty (50) million dinars,
Law No. 2019-47 of May 29, 2019,	Law on improving the investment climate. According to Article 8, the projects of electricity generation from renewable energy provided for by this section, are carried out on real estate owned by individuals. They can be authorized, if necessary, to be carried out on parts pertaining to the fields of the State or the local communities in case the opportunity of their realization is established, having regard to the national strategy fixed by the national plan of the electric energy produced starting from renewable energies. Notwithstanding the provisions of article 8 of the law n° 83-87 of November 11th, 1983 relating to the protection of agricultural lands as modified by the subsequent texts, the realization of the projects of electricity production from renewable energies provided for by the present section, does not require the change of vocation of agricultural lands.

5.2 *International conventions ratified by Tunisia*

Tunisia has ratified more than 60 international conventions and agreements concerning environmental protection. It has developed information systems as part of the implementation of the three Rio Conventions – on Biodiversity, Climate Change and Desertification - to facilitate reporting to various organizations, including: (i) the information system developed as part of the implementation of the Convention on Biological Diversity; and (ii) the information system on the Clean Development Mechanism.

Table 5.2 - International Conventions of relevance to this project and ratification details for Tunisia (Decree / Law and date)

International Conventions	Ratification
Paris Climate Agreement (2015)	Decree No. 2016-125 of October 31, 2016
Stockholm Convention on Persistent Organic Pollutants (POPs)	Decree No. 2004-918 of April 13, 2004
Cartagena Protocol on Biosafety.	Law n°2002-58 of June 25, 2002
Kyoto Protocol and Law 93-46 of May 3, 1993, ratifying the United Nations Framework Convention on Climate Change.	Law 2002-55 of June 19, 2002
Agreement Relating to the Establishment and Operation of the Observatory of the Sahara and Sahel	Law n°2000- 12 of February 7, 2000
Bern Convention on the Conservation of European Wildlife and Natural Habitats.	Law n° 95-75 of 07/08/95
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.	Law 95-63 of July 10, 1995
United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought.	Law 95-52 of June 19, 1995
United Nations Convention on Biological Diversity.	Law 93-45 of May 3, 1993
United Nations Framework Convention on Climate Change.	Law 93-46 of May 3, 1993
Convention on the Conservation of Migratory Species of Wild Animals.	Law 86-63 of July 16, 1986
Convention on Wetlands of International Importance.	Law No. 80-9 of March 3, 1980
Protocol relating to the cooperation of North African States in the fight against desertification.	Law 71-1 of January 25, 1979
African Convention for the Conservation of Nature and Natural Resources.	Law 76-91 of November 4, 1976
Convention for the Protection of the World Cultural and Natural Heritage.	Law 74-89 of December 11, 1974
Convention on International Trade in Endangered Species of Wild Fauna and Flora	Law 74-12 of March 11, 1974

5.3 *IFC Requirements*

In April 2006, the International Finance Corporation (IFC) published a series of eight Performance Standards (PS) that have become an international benchmark for the social and environmental assessment process in which the IFC and other international donors are involved. These standards have been revised and the latest version came into effect in January 2012.

The IFC Performance Standards on Social and Environmental Sustainability provide a framework for managing and improving project performance, from planning and appraisal to construction, operations and closure. The requirements of the Performance Standards are as follows:

- **PS1:** Assessment and management of environmental and social risks and impacts.
- **PS 2:** Labour and working conditions.
- **PS 3:** Resource efficiency and pollution prevention.
- **PS 4:** Community health, safety and security.

- **PS 5:** Land acquisition and involuntary resettlement.
- **PS 6:** Biodiversity conservation and sustainable management of living natural resources.
- **PS 7:** Indigenous peoples.
- **PS 8:** Cultural heritage.

The PSs that apply to the Project are presented below:

Table 5.3 - Performance standards of the IFC

PS	Applies (yes/no)	Justification
PS1: Assessment and management of environmental and social risks and impacts.	Yes	Always applies.
PS 2: Labour and working conditions.	Yes	The Project involves the use of a workforce.
PS 3: Resource efficiency and pollution prevention.	Yes	The Project will use natural resources and generate pollution.
PS 4: Community health, safety and security.	Yes	The Project will generate road safety and other risks to local communities and occupational safety risks to the workforce.
PS 5: Land acquisition and involuntary resettlement.	No	The solar PV Plant and the new 225 kV transmission line of 200 m will not initiate involuntary restrictions on accessing land used for grazing activities. Along the existing 150 kV transmission line, there are 4 structures identified within the STEG's RoW. Specific measures need to be implemented by STEG and local authorities.
PS 6: Biodiversity conservation and sustainable management of living natural resources.	Yes	The Project requires the clearance of land and could impact flora, fauna and birds.
PS 7: Indigenous peoples.	No	No IPs have been identified to be present in this region of Tunisia.
PS 8: Cultural heritage.	No/Yes	Based on the site visit, no archaeological sites were identified within the perimeter of the solar PV plant, except for a few isolated ceramic shards, with no significant archaeological context. Furthermore, the Mehemla archaeological site is located approximately 2.25 km north of the planned solar PV plant location In the event of accidental discovery of archaeological objects and/or ruins during the works, the measures provided for in Articles 26 to 48 of the Code for the Protection of Archaeological, Historical and Traditional Arts Heritage must be applied immediately. Consequently, PS8 applies to the project only in the event of an accidental discovery.

IFC Environmental, Health and Safety Guidelines (EHS Guidelines)

The IFC has prepared a series of Guidance Notes corresponding to the Environmental and Social Performance Standards. These Guidance Notes provide useful advice on the requirements contained in the Performance Standards, including reference documents, as well as good sustainability practices aimed at improving project performance. These Guidance Notes do not define a policy, but explain the requirements contained in the Performance Standards. Regarding the Project, the following points are applicable:

- General EHS Guidelines of the World Bank Group used by IFC (2007): present environmental,

health and safety issues specific to the sector in question.

- Environmental, Health and Safety Guidelines for Mining (IFC, 2007): present environmental, health and safety issues related to mining activities (including mineral processing facilities) that may arise during the project phases.
- Environmental, Health and Safety Guidelines for Waste Management Facilities (IFC, 2007).
- IFC EHS Guidelines for Electricity Transmission and Distribution (2007): applicable to project-related facilities (i.e., transmission line for grid connection). These guidelines identify the main E&S impacts that need to be studied and provide detailed technical and management recommendations regarding industry best practices. The IFC Environmental, Health and Safety Guidelines (EHS Guidelines) identify the following key issues:
 - Biodiversity (including birds and bats)
 - Electric and magnetic fields (EMF)
 - Hazardous materials
 - Occupational health and safety
 - Community health and safety

The EHS guidelines applicable to associated facilities include:

- IFC Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets;
- IFC Good Practice Handbook on the Use of Security Forces: Assessing and Managing Risks and Impacts
- IFC Good Practice Note on Social Considerations;
- Private Sector Project Dimension;
- IFC and EBRD: Worker's Accommodation - Processes and Standards (2009).

5.4 Environmental and Social Policy (2024) of the EBRD

The ESRs that apply to the Project are presented below:

Table 5.4 - Environmental and Social requirements of the EBRD

ESR	Applies (yes/no)	Justification
ESR 1: Assessment and management of environmental and social risks and impacts	Yes	Always applies.
ESR 2: Labour and working conditions	Yes	The Project involves the use of a workforce.
ESR 3: Resource efficiency and pollution prevention and control	Yes	The Project will use natural resources and generate pollution.
ESR 4: Health, safety and security	Yes	The Project will generate road safety and other risks to local communities and occupational safety risks to the workforce.
ESR 5: Land acquisition, restrictions on land use and involuntary resettlement	No	The solar PV Plant and the new 225 kV transmission line of 200 m will not initiate involuntary restrictions on accessing land used for grazing activities. Along the existing 150 kV transmission line, there are 4 structures identified within the STEG's RoW. Specific measures need to be implemented by STEG and local authorities.

ESR	Applies (yes/no)	Justification
ESR 6: Biodiversity conservation and sustainable management of living natural resources	Yes	The Project requires the clearance of land and could impact flora, fauna and birds.
ESR 7: Indigenous Peoples (IP)	No	No IPs have been identified to be present in this region of Tunisia.
ESR 8: Cultural heritage	No/Yes	Based on the site visit, no archaeological sites were identified within the perimeter of the solar PV plant, except for a few isolated ceramic shards, with no significant archaeological context. Furthermore, the Mehmla archaeological site is located approximately 2.25 km north of the planned solar PV plant location. In the event of accidental discovery of archaeological objects and/or ruins during the works, the measures provided for in Articles 26 to 48 of the Code for the Protection of Archaeological, Historical and Traditional Arts Heritage must be applied immediately. Consequently, ESR8 applies to the project only in the event of an accidental discovery.
ESR 9: Financial intermediaries (FI)	No	The Project does not involve an FI.
ESR 10: Stakeholder engagement	Yes	Always applies.

5.5 EU requirements

The project must also comply with relevant European directives, as summarised in the following table:

Table 5.5 - European directives

European Directive	Key requirements
EIA Directive 2014/52/EU	<p>The Environmental Impact Assessment (EIA) Directive (2011/92/EU, amended by 2014/52/EU) is a legal framework established by the European Union to ensure that the potential environmental effects of public and private projects are identified and assessed before authorisation is granted. The main requirements of the EIA Directive concern screening, scoping and impact assessment:</p> <p>1. Screening: is the process used to determine whether a proposed project requires an EIA. The EIA Directive provides two lists of projects in its annexe:</p> <ul style="list-style-type: none"> • <u>Annex I projects</u>: These are large-scale projects (oil refineries, waste treatment plants, etc.) that automatically require an EIA due to their significant environmental impacts (this is the case for this project). • <u>Annex II projects</u>: These projects (e.g. urban development, agricultural projects) must be determined on a case-by-case basis by the competent authorities. This process assesses the characteristics, location and potential impact of the project and may involve the application of specific thresholds or criteria. <p>Key requirements:</p> <ul style="list-style-type: none"> • <u>The competent authorities must decide, on the basis of defined criteria, whether projects falling under Annex II require a full EIA.</u> • <u>Developers must provide sufficient information to facilitate the selection decision.</u>

European Directive	Key requirements
	<ul style="list-style-type: none"> • <u>Public</u> and environmental authorities may be consulted as part of the screening decision. <p>2. Scoping: Scoping is a phase during which the scope and level of detail of the information to be included in the EIA report are determined. It ensures that the most significant environmental impacts are taken into account and avoids unnecessary information.</p> <p><u>Key requirements:</u></p> <ul style="list-style-type: none"> • <u>Developers may request the competent authority to define the scope of the environmental report.</u> • <u>The scoping procedure must identify the main impacts associated with the project.</u> • <u>Scoping ensures that the EIA focuses on the most significant effects (e.g. on air, water, soil, biodiversity).</u> • <u>The relevant stakeholders (authorities, the public and experts) are often consulted</u> to ensure a comprehensive scope. <p>3. Impact assessment: Impact assessment is the core part of the EIA procedure, during which the project proponent must prepare an EIA report (environmental statement) evaluating the project's likely significant effects on the environment. The report must provide a detailed analysis to inform decision-making.</p> <p><u>Key requirements:</u></p> <ul style="list-style-type: none"> • <u>EIA report:</u> The developer must prepare an EIA report containing: <ul style="list-style-type: none"> ○ A description of the project (including location, design, and size). ○ An overview of the alternatives considered. ○ A description of the current state of the environment. ○ An assessment of likely significant environmental impacts (e.g. noise, pollution, waste, loss of biodiversity). ○ Mitigation measures to prevent, reduce or offset negative effects. ○ A non-technical summary that can be understood by the general public. • <u>Consultation:</u> The public, the competent environmental authorities and all other stakeholders must be consulted. • <u>Transboundary impacts:</u> If a project is likely to have transboundary effects, the Member States concerned must be informed and consultations must be organised. • <u>Decision:</u> The competent authority must consider the EIA report, consultation responses, and public feedback before granting development authorisation.
Habitats Directive 92/43/EEC	The Habitats Directive (Council Directive 92/43/EEC) was adopted in 1992, thirteen years after the Birds Directive. Like the Birds Directive, the Habitats Directive requires all Member States to establish a strict protection regime for the species listed in Annex IV, both inside and outside Natura 2000 sites.
Birds Directive 209/147/EC	This directive concerns the conservation of all species of birds naturally occurring in the wild within the European territory of the Member States to which the Treaty applies. It covers the protection, management and control of these species and lays down rules for their exploitation.
ATEX Directives: Directive 2014/34/EU (ATEX 114) Directive 1999/92/EC (ATEX	The ATEX Directive 2014/34/EU was published on 29 March 2014 by the European Parliament. It refers to the harmonisation of Member States' legislation on equipment and protective systems intended for use in potentially explosive atmospheres.

European Directive	Key requirements
153)	

5.6 Project categorisation

In accordance with the **IFC's** environmental and social project categorisation, the solar PV plant project could be classified as **Category B**, which corresponds to commercial activities with limited potential environmental and/or social risks and/or impacts that are few in number, generally site-specific, largely reversible and easily addressed by mitigation measures.

In accordance with the **EBRD's** Environmental and Social Policy (2024), the solar PV plant project could be classified as **Category B**, which corresponds to projects that may cause environmental and/or social impacts that are generally limited to a specific site and/or can be readily identified and mitigated by appropriate and effective measures.

The ESIA and its associated documentation (ESMP, SEP and NTS) for Category B projects will be disclosed for 30 calendar days prior to the project's review by the Board of Directors.

6.0 STAKEHOLDER ENGAGEMENT OUTLINES

6.1 Identification of stakeholders

Project stakeholders are defined as individuals, groups or communities who:

- Will be affected or are likely to be affected, positively or negatively, directly or indirectly, by the project ("project-affected parties"), particularly those who are directly and negatively affected by project activities, including those who are disadvantaged or vulnerable; or
- May have an interest in the project and/or the ability to influence its outcomes, positively or negatively ("other influential/interested groups").

This ESIA report is accompanied by a SEP, which is a requirement of PS1 Assessment and management of environmental and social risks and impacts. and ESR10: Stakeholder Engagement.

The SEP describes the Promoter's systematic approach to stakeholder engagement throughout the project's lifetime, which aims to establish and maintain constructive relationships with stakeholders, undertake inclusive engagement activities, ensure that relevant E&S documentation is disclosed and used as the basis for meaningful engagement, and describes its grievance mechanism that can be used by stakeholders to raise a concern about the Project.

6.2 Scheduled sessions for consultation with stakeholders

6.2.1 Regional governmental entities

A consultation session with the key regional governmental entities took place on August 12th, 2025 in the governorate of Gabes. Throughout the consultations a leaflet (see Appendix 1) was prepared and distributed to such stakeholder groups with key information that included a map of the project location. Details of the main infrastructure components (solar panels, the transmission line), the scope of the ESIA and planned stakeholder engagement was provided using a presentation (refer to Appendix 2). The table below presents a summary for the outcomes of the stakeholder consultation undertaken with regional government entities.

Table 6.1 - Summary of stakeholder engagements undertaken to date

Stakeholder	Key summary
Date : August 12 th , 2025 Participants (17) : <u>Representatives from regional governments and municipal authorities</u> + 2 Developer (Vitalia) + 4 EAM <ul style="list-style-type: none"> ▪ Governor of Gabes ▪ Primer Delegate ▪ Representatives of parliament, ▪ Representative of municipality ▪ Representative of ONAS ▪ Representative of SONEDE ▪ Representative of CRDA ▪ Representative of INP ▪ Representative of STEG district ▪ Representative of the Ministry of Equipment ▪ Press and Media. 	<ol style="list-style-type: none"> 1. Local employment and social inclusion (Top priority) <ul style="list-style-type: none"> ▪ The Governor of Gabes supports the project, while emphasizing the importance of taking CSR seriously, recalling the broken promises of certain companies. ▪ The member of parliament insists on the priority to be given to CSR; another proposes a formal agreement between Vitalia and the governorate to ensure its implementation. ▪ The local purchase of construction materials is recommended to maximize regional economic benefits. ▪ The representative proposes the implementation of a mechanism to monitor and evaluate CSR commitments. ▪ Employment opportunities should be prioritised for Menzel Habib. 2. Consideration of the local context and territorial impact <ul style="list-style-type: none"> ▪ A member of parliament points out that Menzel El Habib is a rural area requiring a tailored approach.

Stakeholder	Key summary
	<ul style="list-style-type: none"> ▪ She mentions the abandonment of agricultural projects due to administrative obstacles and calls for these obstacles to be removed. 3. Environment and authorisations <ul style="list-style-type: none"> ▪ The deputy expressed concern about the project's environmental impact, while stating that she remained in favor of the project if the impacts were controlled. 4. Tax aspects and territorial equity <ul style="list-style-type: none"> ▪ The municipal representative pointed out that the municipalities hosting the projects do not receive the tax revenues, which are paid to the municipality of Tunis. 5. He called for a review of the tax distribution model so that the regions concerned benefit directly from the projects.

A letter addressed to the governor of Gabes, the list of participants, the minutes of the meeting with regional government entities, and media coverage of the project are presented in the Appendix 3. Photos of the regional governmental entities' consultation are presented below.



Figure 6.1 - Photos of the meeting with the governor of Gabes – August 12 - 2025

6.2.2 Local community and landowner

The following consultations were carried out:

- Discussion with a group of men (24)
- Interview with three landowners (1 landowner of the solar PV plant and the new 225 kV transmission line of 200 m and 2 neighbouring landowners).

The consultation was organised during an event held by the Developer on 12 August 2025 at Mehemla Primary School, in the presence of the delegate of Menzel Habib, the Omda, representatives of parliament, landowners and local community of El Mehemla. This followed the recommendations of EAM. A leaflet was used to include an overview of the Project.

The table below presents summary for the outcomes of the stakeholder consultation undertaken, while the figure that follows presents sample photos.

Table 6.2 - Summary of stakeholder engagements undertaken on 12 August 2025

Stakeholder	Key summary
Date: August 12, 2025 Local community: El Mehemla Men's Group (24 men)	<ul style="list-style-type: none"> - El Mehemla region is experiencing significant population migration due to a lack of employment opportunities and amenities. - The percentage of women in the population is higher than that of men, due to the departure of men to work in other regions. - There are no recorded conflicts between the inhabitants of the region. - The majority of the population is unemployed. The main local activities, such as olive cultivation and grazing, are facing difficulties due to drought and low incomes. - The three main vital needs expressed are: employment opportunities, a

Stakeholder	Key summary
	<p>local health centre lacking equipment and permanent medical staff, and concerns about the closure of the Mehemla school, which has only about 10 pupils.</p> <ul style="list-style-type: none"> - An agricultural track crosses a wadi, making it difficult to pass during sandstorms. - The electricity supply is satisfactory, but there is a lack of street lighting. - The quality of the water supplied by SONEDE is poor. Local community use water from the Majel or filtered water, as it is cheaper than bottled water. - There is no public landfill in the region; each resident manages their own waste. - ONAS does not provide connections in the region, and residents use septic tanks. - The community is not opposed to the project, particularly because the land is privately owned. Some have expressed a desire for employment opportunities for women.
<p>Date: August 12, 2025 Consultation with landowners</p>	<ul style="list-style-type: none"> - They all own plots of land with proof of ownership. Currently, this land is not being farmed because it is not profitable. It was previously used in part for growing crops, but today it is used solely for grazing. - The herders grazing on the landowners' land are those who hired them. There are no informal herders on the project site. - They stated that their quality of life has deteriorated in recent years due to drought, which has had an impact on their livelihoods. They proposed drilling wells for use in agricultural irrigation. - They all assured that their land is not being used by any third party, with or without authorisation, and specified that there are no conflicts in the region. - They indicated that their land does not contain any dwellings or Majel. - Finally, they expressed their satisfaction with the project, believing that it will bring both direct and indirect benefits to themselves and their region.



Figure 6.2 - Men's focus group in the village of El Mehemla – August 12 - 2025

6.2.3 Consultations during Environmental and Social Due Diligence (ESDD)

During the Environmental and Social Due Diligence phase (August 2025), consultations were held with local entities and the community. The main points raised are summarized in the table below.

Table 6.3 - Key findings from the consultation with local entities

Date and Entity / Meeting	Key Points
<p>26/08/2025 STEG</p>	<ul style="list-style-type: none"> - Legal department to handle cases of constructions near power lines. - Request for validation of ongoing E&S studies. - Coordination required with the operations department. - First intervention to reinforce an existing high-voltage line.

Date and Entity / Meeting	Key Points
	<ul style="list-style-type: none"> - Dedicated management system in progress. - In addition, records indicate that no collisions or electrocution incidents have been reported along the existing TL.
27/08/2025 INP	<ul style="list-style-type: none"> - Roman archaeological site >2 km from the PV site. - All sites have heritage value. - Caution recommended when vehicles are passing through during the construction phase. - Checking the cultural use of Mzar with the local population.
27/08/2025 Governor and Secretary General	<ul style="list-style-type: none"> - Importance of complying with international and national standards - Need for a clear CSR policy and regular monitoring to develop a community development plan aligned with government priorities. - Coordination requested for structures located within the right-of-way of the Bouchamma–Mdhilla transmission line.
27/08/2025 STEG (Bouchamma substation)	<ul style="list-style-type: none"> - The schedule of upgrading the TL Bouchamma – Mdhilla has not yet been prepared. It will be proposed by the EPC. - The operation of the TL is separate from that of the thermal power station. - STEG plans to add two cabinets and two control cabinets to the existing old room (low-voltage section). - The technical specifications for the equipment will be provided by STEG's equipment department. - The procedure and operating mode must be validated in advance by STEG. - The "Bouchemma – Mdhilla" line begins at pylon no. 9, as the line starts before the Gannouch 150 kV substation, which is now decommissioned. There are eight unconnected pylons before pylon no. 9. - The addition of new pylons on the STEG side must be confirmed with Volitalia. - Monitoring and maintenance of the Bouchemma – Mdhilla line: <ul style="list-style-type: none"> - Daily status checks and regular inspections once every six months. - For avifauna: no incidents involving large birds (storks) have been reported along the TL. The main cause of damage remains humidity. - At each visit, a written report must be sent to the legal district in the event of construction or intervention within the line's right-of-way.
27/08/2025 Representative of the El Mehemla community	<ul style="list-style-type: none"> - A Mosque located 2 km from the solar PV site is used as cultural belief. - Students walk to school no transport. - Roman archaeological site frequented by locals.
27/08/2025 Landowner	<ul style="list-style-type: none"> - Holds 400 ha, land titles in progress. - The owner employs a shepherd to take care of his livestock. The duration of employment can vary from 3 months to 10 years. - The lands adjacent to the PV site are used by the owner for agriculture and equipped with a water well about 60 m deep - No informal shepherd exploits the lands belonging to the owner.
27/08/2025 Owner employed Shepherd	<ul style="list-style-type: none"> - Provided with accommodation by the owner and has been working for 3 months. - Sometimes uses the railroad tracks (train passage is signaled in advance by an alarm to avoid any risk). - Previous experience as a farm worker, including driving tractors.
27/08/2025 Delegate from Menzel Habib	<ul style="list-style-type: none"> - Project well received (peaceful area) - Local workforce available (PV Scatec experience). - Study underway on the economic corridor linking: Bouchebka to Gabes (RN15) over approximately 240 km
28/08/2025 SNCFT	<p>Project to increase the capacity of the railway line</p> <ul style="list-style-type: none"> - Change from 4 pairs (8 return trips) to 5 pairs, using the same corridor. - No impact of the planned works on the Volitalia project facilities. - Railway area: 34 m. - Platform and rail renewal works scheduled for 2026, 2027 and 2028. - Signing of EPC contracts scheduled for November 2026 - Coordination required in terms of scheduling, prevention plan and actions to implemented. <p>Incidents and safety</p> <ul style="list-style-type: none"> - On average, one derailment incident per year (caused by track anomalies or livestock crossing the tracks). Latest cases in 2017 and 2018. - Current speed limited to 60 km/h (or even 40 km/h in some places) compared to km/h, due to the condition of the track (in use for over 30 years). - Preventive maintenance required every 20 to 25 years. - No night-time lighting on the track for Volitalia. <p>Other technical considerations</p> <ul style="list-style-type: none"> - Hydraulic structures to be replaced and reinforced (study in progress). - Transport of wet phosphate. - Height of cable above railway line: 11 m.

Date and Entity / Meeting	Key Points
	<ul style="list-style-type: none"> - Pylon distance: 30 m. - In the event of future electrification of the track, the height will need to be increased to 20 m (very long-term project, 30-year horizon).
<p>28/08/2025</p> <p>Group of women</p>	<ul style="list-style-type: none"> - Not informed about the public consultation meeting. - Several women do not wish to participate in public meetings due to a male-dominated mentality and gender inequality. - Strong involvement in agriculture; women trained (energy, IT, law, etc.). - Transportation and health issues. - No violence reported in relation to foreigners. (project under construction by an Egyptian EPC contractor for Scatec PV site in Sidi Bouzid). - Frequent cases of domestic violence (physical, psychological, financial). - Local NGOs (JSF, Jeunesse Sans frontières) organize awareness-raising campaigns on women's rights, the fight against violence, and existing remedies (complaints, shelters). - Men are also being made aware of these issues. - Project viewed positively: employment, local development, combating exodus)

6.3 Workshop with AAO “Association les Amis des Oiseaux” – Birdlife Partenaire

In June 2024, EAM participated in a workshop organized by Les Amis des Oiseaux (AAO/BirdLife Tunisia) as part of the national census of the White Stork population in Tunisia.

During this workshop, discussions were held regarding the monitoring of bird mortality resulting from collisions with high-voltage power lines.

According to the exchanges, no official or systematic national monitoring program for bird collision has yet been established in Tunisia.

In addition, a presentation and training session were provided on the use of the **e-faunalert** platform (IUCN-MED), which supports data collection on avifauna interactions with TL.

It should be noted that STEG in cooperation with AAO, installed artificial nesting platforms on selected pylons to reduce collision risk and associated technical outages mainly for distribution lines.

7.0 ENVIRONMENTAL AND SOCIAL BASELINE CONDITIONS

The objective of the Environmental and Social (E&S) baseline conditions is to describe the physical, biological and socio-economic characteristics of the solar PV Plant, the new 225 kV transmission line of 200 m and the existing 150 kV transmission line of 140 km. This section describes the baseline conditions of the area potentially affected by the construction, operation and decommissioning activities of the Project. The baseline description is based on a literature review of the available data including readily available public and private reports, publications, government reports and World Bank reports supplemented by field data collected during site visits to the Project footprint undertaken in May 2023 and February 2025 (the geolocated photos taken during this day's visit are provided in Appendix 4, and information from the stakeholder engagement activities conducted to date.

7.1 *Environmental Baseline Conditions for the solar PV plant and the new 225 kV TL*

7.1.1 Climate

The project site belongs to the lower arid bioclimatic zone with mild winters, influenced by the Mediterranean climate. Situated between two different currents, the Sahara to the south and the Mediterranean to the east, the area of interest is subject to significant variations from one year to the next, resulting in drought and flooding.

According to information provided by National Oceanic and Atmospheric Administration (NOAA):

- The average annual temperatures recorded in the study area over the last decade (2015-2024) are around 21°C. However, an absolute minimum of around -2°C is recorded in January and an absolute maximum of around 48.4°C in July.
- The average monthly rainfall recorded in the project area over the last decade varies between a minimum of 0.1 mm in July and a maximum of 13.1 mm in March. The maximum rainfall is observed in February with 60.8 mm.

The Relative humidity in the study area varies between 38% and 63%.

- From 2015 to 2024, the average annual speed recorded over the last decade is 4.59 m/s. Inter-seasonal values show a dominance of winds from specific sectors depending on the season. In winter, winds blow mainly from the Southwest, representing 26.7% of observations. In spring, the east sector predominates with 47.9% of measurements. This trend also continues in summer, when winds from the east sector reach 50.9%. Finally, in autumn, winds again come from the Southwest, though in a slightly lower proportion, at 26.1%. These seasonal variations show the influence of different wind directions on climatic conditions, highlighting the diversity of wind patterns throughout the year.

The monthly average GHI (global solar radiation) between 2015 and 2024 varies from 88.3 kWh/m² in December to 247 kWh/m² in July, with an annual average of 1,955 kWh/m² per year.

7.1.2 Air quality

The area surrounding the solar PV plant is mainly agricultural and does not present any significant sources of atmospheric emissions. Located in a rural area, the site is approximately 4 km from the RN15 motorway and nearly 50 km from the Gabes industrial zone. The absence of major polluting activities in the surrounding area limits the presence of particulate matter and gaseous pollutants, ensuring a relatively unspoilt environment.

7.1.3 Noise and vibration

The solar PV plant is located in a rural area away from major sources of noise, such as industrial activities, heavy road traffic or urban infrastructure. As a result, the site experiences very low

background noise levels, ensuring a quiet and undisturbed acoustic environment. Background noise levels will be considered in accordance with the World Bank EHS Guidelines, as further detailed in Chapter 8.

7.1.4 Natural regions, geology, topography, geomorphology and soils

7.1.4.1 Natural regions

According to the map of natural regions of Tunisia, the Solar PV plant is located in pre-Saharan Tunisia, in the natural region of the southern low plains. Generally, the southern low plains natural region corresponds to vast expanses mainly consisting of sedimentary formations of alluvial and eolian origin, shaped by arid climatic dynamics. The landscape is characterised by sparse vegetation, composed of species adapted to water stress conditions and sometimes high salinity.

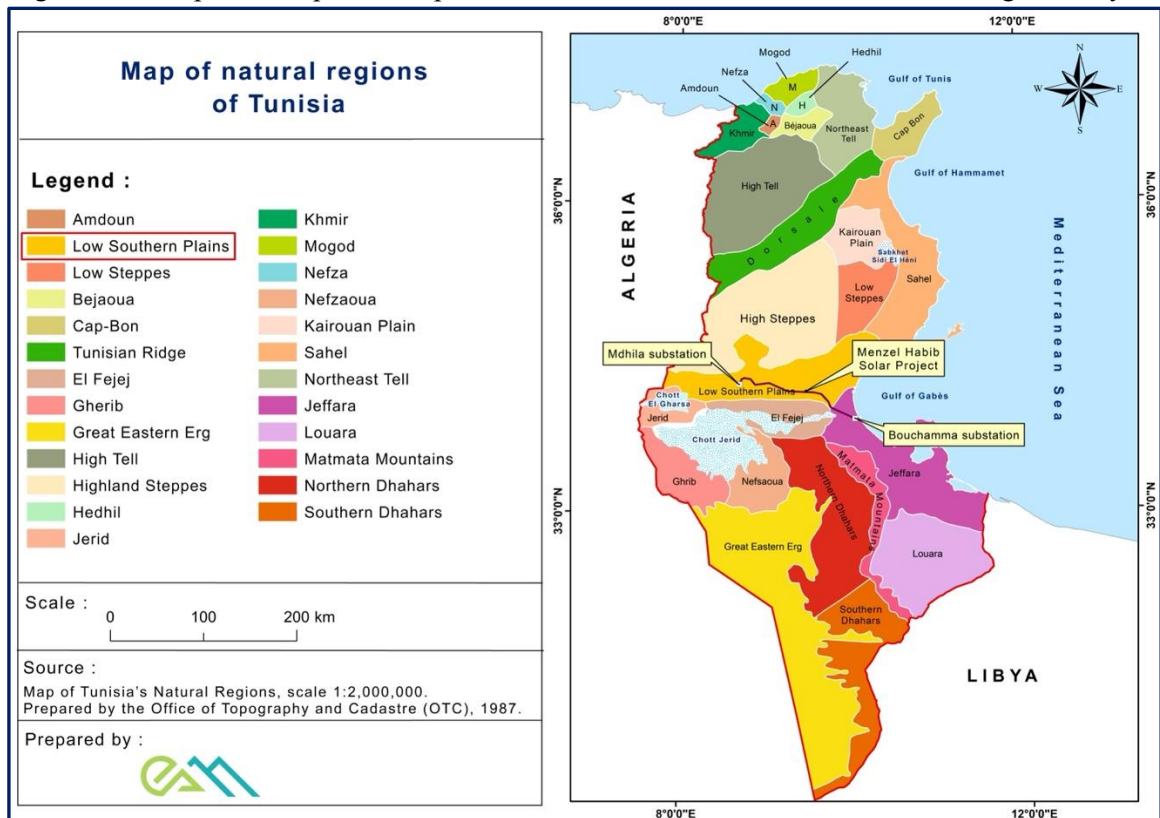


Figure 7.1 - Map of natural regions in the study area

7.1.4.2 Geology

The Solar PV plant is mainly located on a plain of Quaternary origin. According to the geological map, the site belongs to the Middle to Upper Pleistocene. It consists of ancient alluvial deposits with limestone and gypsum crusts. The limestone outcrops correspond to formations from the Middle Pleistocene continental period and represent the most consolidated part of the Solar PV plant.

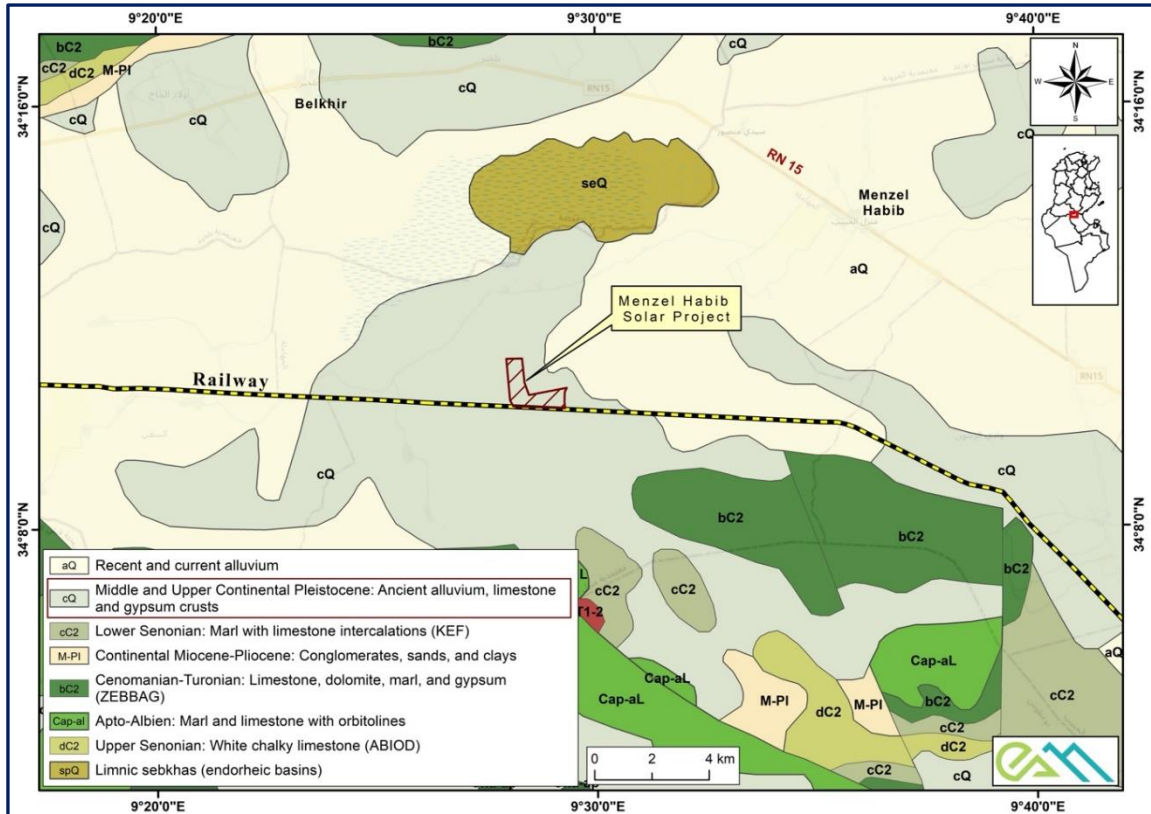


Figure 7.2 - Geological map of the study area

According to the geotechnical, geological and geophysical survey (interpretation report - 2024), the results of the geotechnical investigations by core drilling identified the following lithology:

- **Fine dune sand:** identified between the surface and a depth of -0.50 m.
- **Carbonated sandy-clay silt with a beige to brick-red top and traces of gypsum:** identified between 0.00 m and -6.00 m depth. The mechanical characteristics are high.

7.1.4.3 Geomorphology -Topography

On a larger scale, the Solar PV plant is located in the Ségui plain, also known as the Ségui-Zograta basin. This is a vast flat topographical depression approximately 80 km wide, oriented from west to east, with its eastern end opening onto the sea. This plain is framed by several distinct geomorphological units. It is bounded to the south by a mountain range extending from Jebel Haira in the southeast to Jebel Sif Laham and Jebel Naima in the southwest, passing through Jebel Es-Stah and Jebel Beida in the south. To the northwest, the plain is bordered by Jebel Chemsî, while Jebel Ben Kreir marks its northern limit (Zohra Kraiem et al., 2013) (Jebel can be written Jbal or djebel). The map below shows all of these reliefs and their position in relation to the Solar PV plant. It should be noted that the names of the reliefs mentioned here are taken from the work of Zohra Kraiem et al. (2013), although other names may appear in the literature and bibliography.

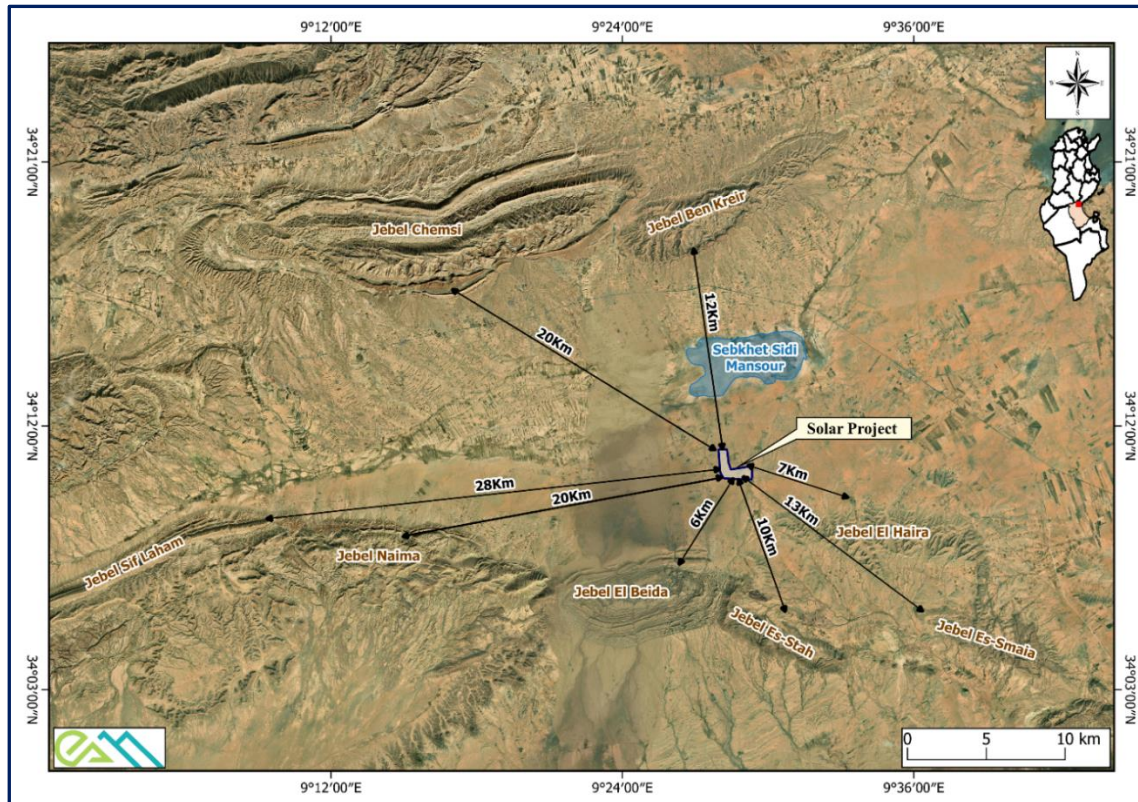


Figure 7.3 - Relief features surrounding the Ségui-Zograta basin and their distance from the Solar PV plant

At the site, the terrain is generally flat, with an altitude varying between 95 and 111 meters (see Figure 7.4 - Terrain map) and a very gentle slope not exceeding 0.8° (see Figure 7.5 - Slope map), with no major topographical variations or faulted structures. However, at the southern end of the site, sedimentary deposits have caused undulations in the terrain. These formations are likely the result of water erosion, which, by transporting and depositing sediments, has shaped small hills composed of clay-sandy deposits. This phenomenon is particularly noticeable in the southeastern part of the site, near the railway line, where a dry wadi has encouraged the accumulation of sedimentary material. Thus, although the dominant morphology of the site is flat, a few localised micro-reliefs appear in its southern part (not exceeding 1 meter), under the combined effect of water erosion and sedimentation processes.

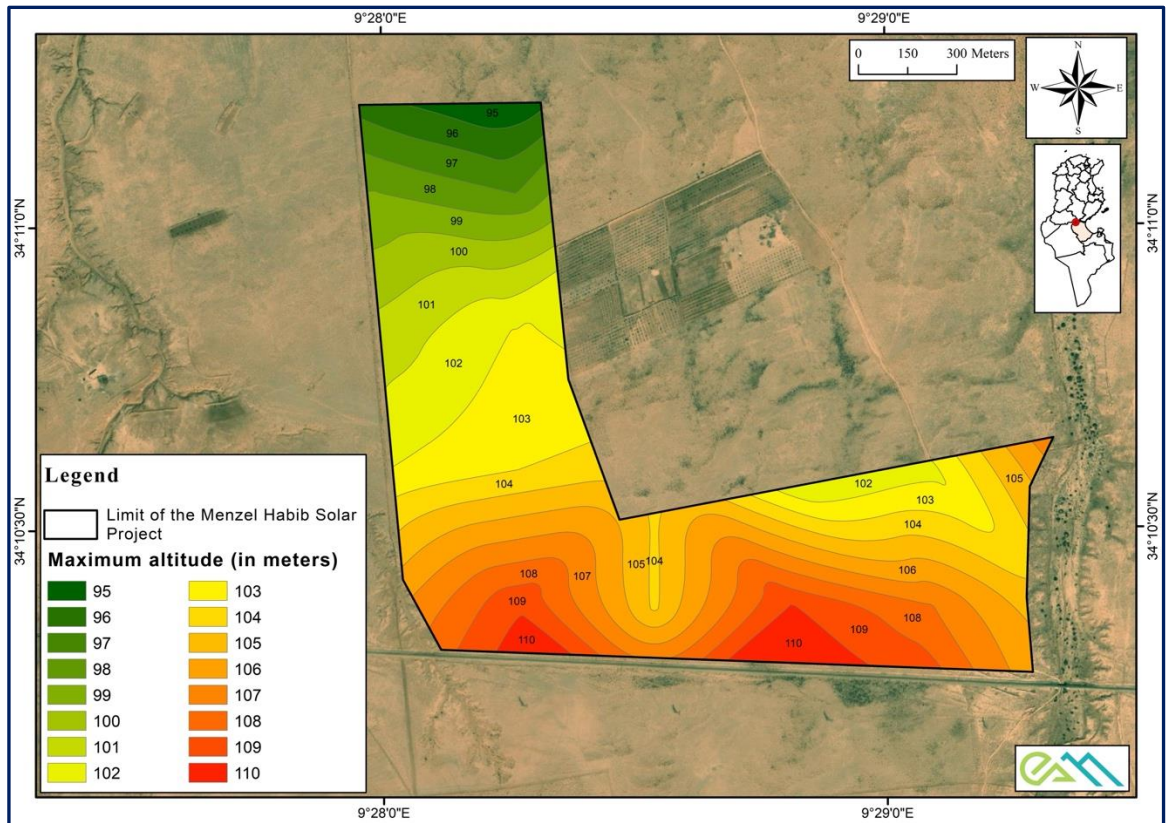


Figure 7.4 - Relief map showing the predominance of heights to the south of the Solar PV plant

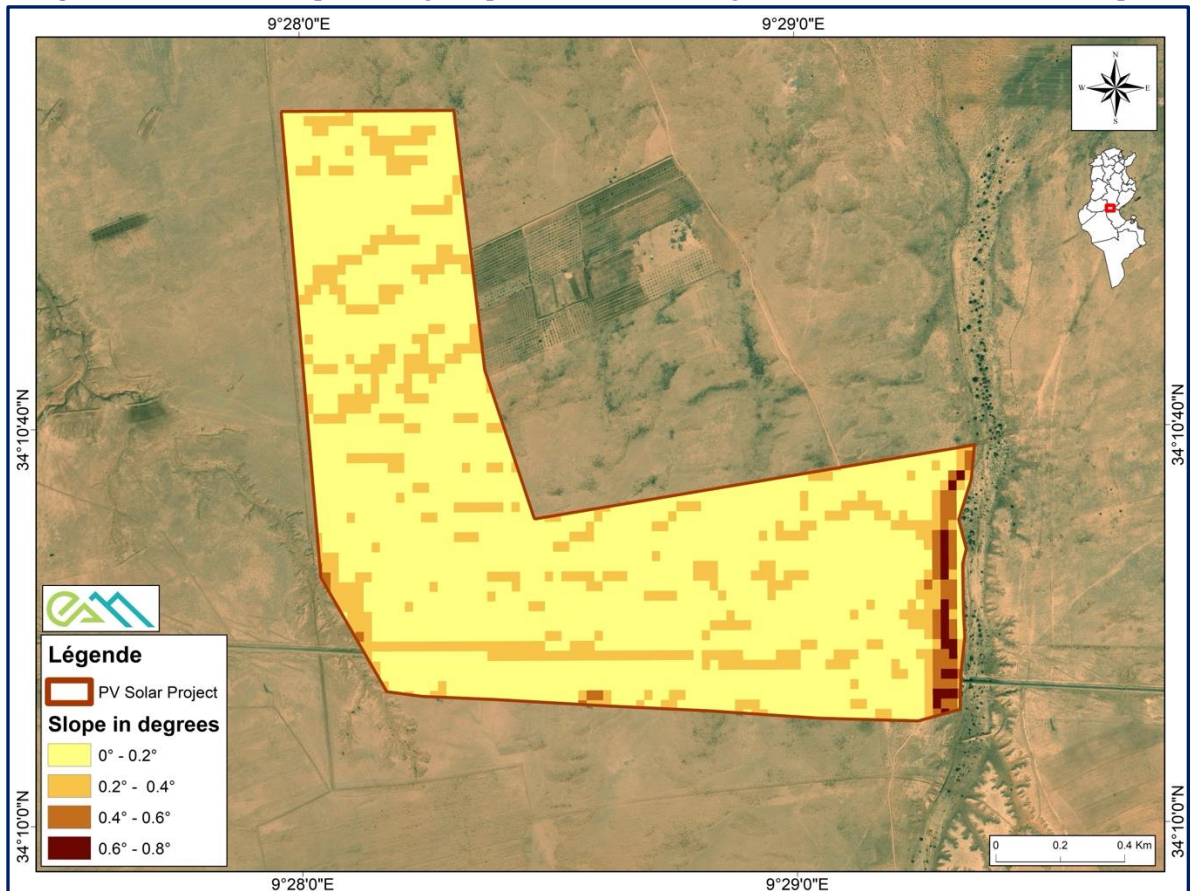


Figure 7.5 - Slope map of the solar PV plant: Slightly steep slope to the south-east

7.1.4.4 Pedology

In the study area, several factors have played a decisive role in pedogenetic processes. At a regional scale, soils are characterised by the constant presence of sand with outcrops of limestone, gypsum and saline soils, typical of arid environments. At the Solar PV plant, two types of soil have been identified:

- Poorly developed soils: these are poor in organic matter, shallow and have a poorly developed structure. It is important to note that the majority of the site consists of this type of soil, which directly influences its properties and its ability to support vegetation
- Isohumic soils: these are mainly found in the southern part of the site and are characterised by an almost constant organic matter content throughout the profile. Compared to poorly developed soils, they are richer in organic matter, having benefited from amendment due to water erosion. This process occurred thanks to sediments transported by water runoff, which contributed to soil enrichment.

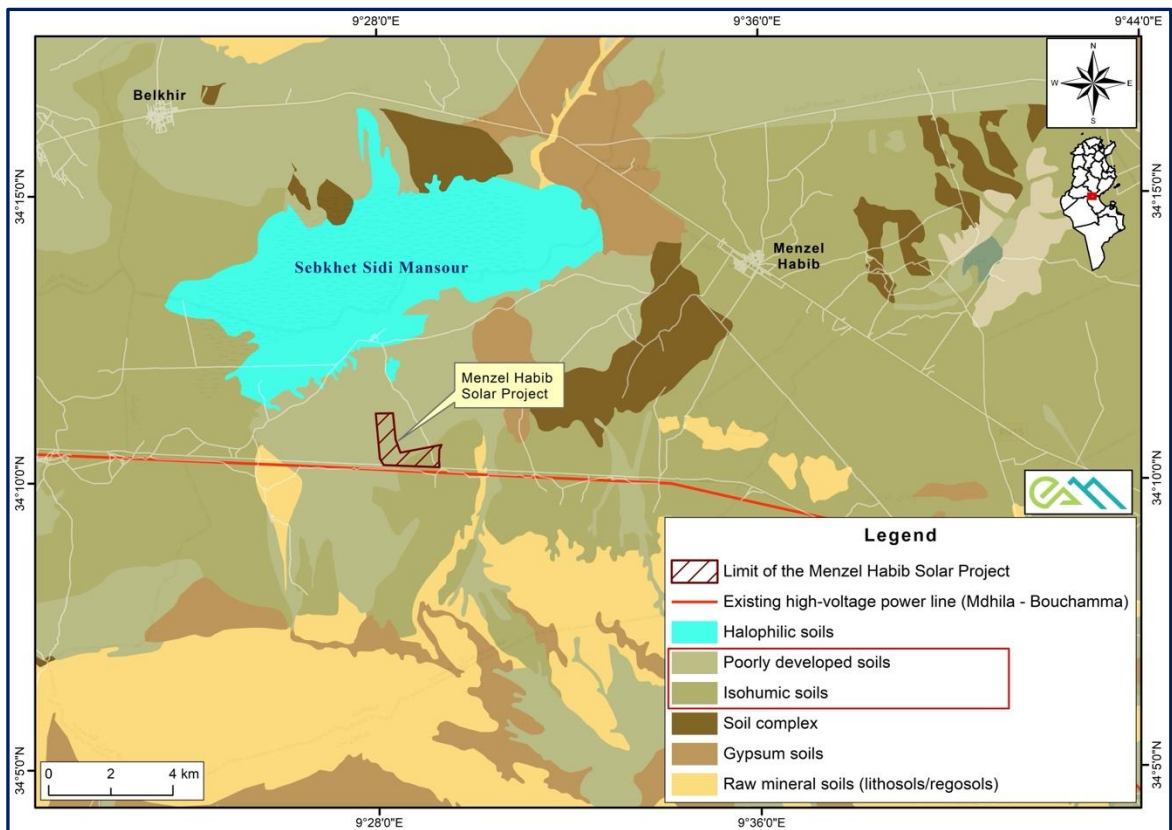


Figure 7.6 - Soil map of the study area

7.1.4.5 Soil erosion

It is important to note that the Menzel Habib region is subject to wind erosion. A process of moderate localised ravine erosion is observed mainly in the southern part of the Solar PV plant. Unlike wind erosion, this phenomenon is the result of water erosion and is caused by incision under the effect of water runoff. This dynamic causes progressive soil alteration, making the area vulnerable to erosion, especially during periods of rain. The accumulation of water transported sediments is particularly visible in the south of the site, especially under the railway line, where sediment deposits have formed as a result of erosion.

Based on the figure below, a single process of water erosion is found throughout the Solar PV plant, with incision dynamics and moderate severity.

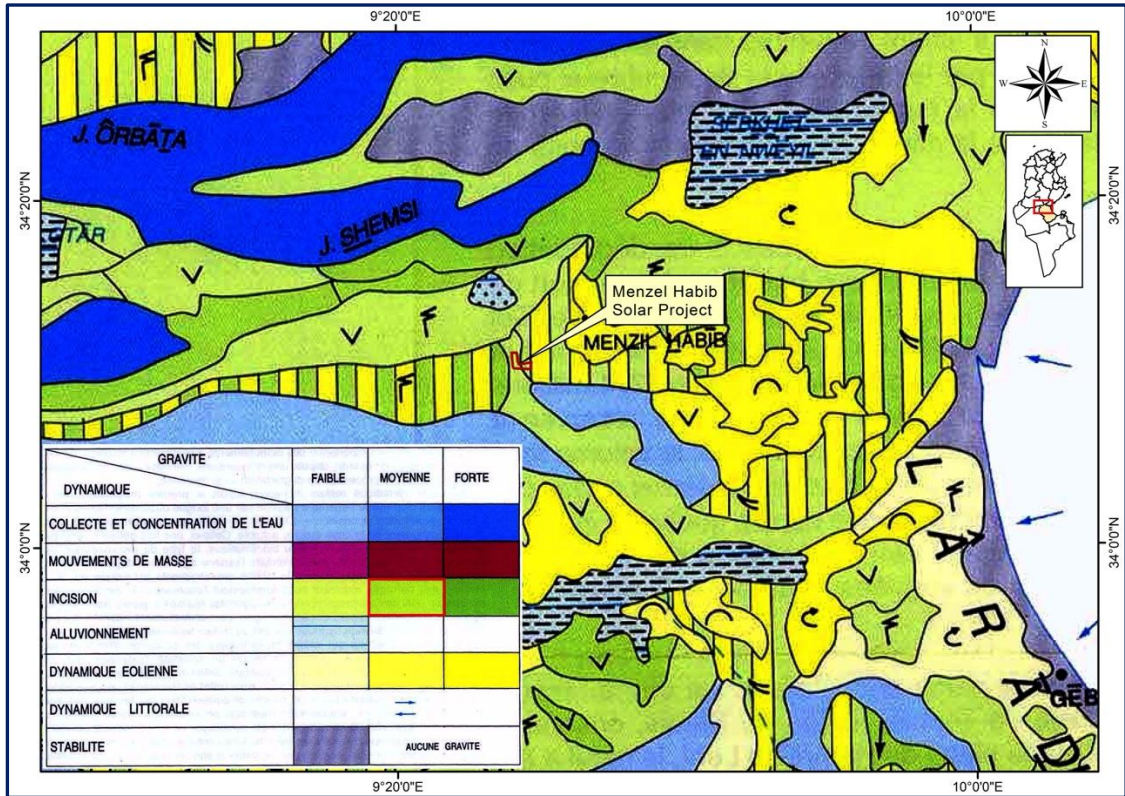


Figure 7.7 - Erosion map of the study area

7.1.5 Hydrology and hydrogeology

7.1.5.1 Hydrology

According to the hydraulic study (carried out in February 2024), the hydrology of the site is characterized by two watercourses:

- The first is the El Herriga wadi, which runs along the eastern boundary of the project site with an average bed width of 100 m and banks 2 m high.
- The second flow, which is a tributary of the El Oussif wadi, is characterised by a diffuse bed in its upstream section, but as it approaches the western boundaries of the project site, it becomes more pronounced with an average width of approximately 30 m and banks no more than 1 m high.
- Inside the project site, the watercourses are diffuse and flow in a north-easterly and north-westerly direction, following the existing earth embankments downstream of the railway line.

Delimitation of Watersheds

According to the hydraulic study (carried out in February 2024), the figure below shows the delimitation of watersheds of the different hydrological units, which was carried out using Global Mapper and Arcgis software.

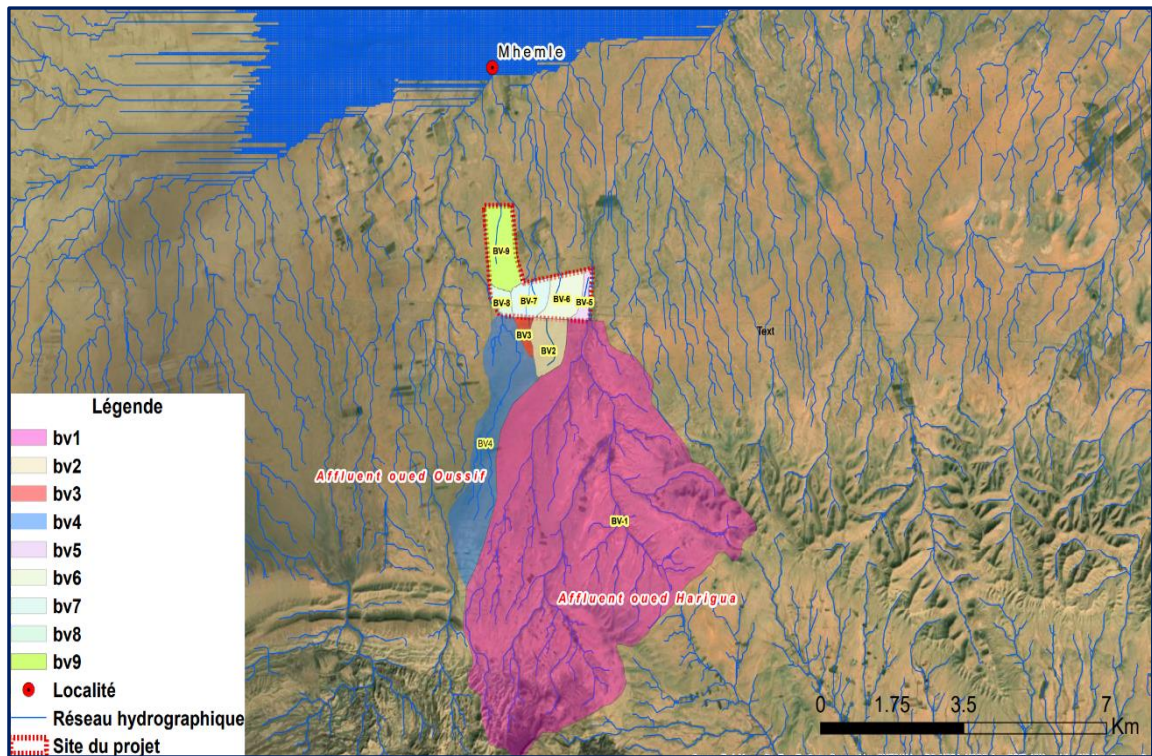


Figure 7.8 - Watersheds delimitation plan (BTE (2024) hydraulic study, page 43)

For each watersheds, the physical and morphological characteristics (area, perimeter, length of the main thalweg and average slope) are recorded in the table below:

Table 7.1 - Physical and morphological characteristics of the catchment areas (BTE (2024) hydraulic study, pages 43-44)

Watershed		Area (km ²)	L Talweg (km)	Perimetre r (km)	Hmin	Havg	Max	Slope (%)
External watersheds	BV-1	24,500	8,850	21,600	105	295	485	4.29
	BV-2	0.600	0.920	3.100	110	112.5	115	0.54
	BV-3	0.160	0.380	2.000	108	110.5	113	1.32
	BV-4	3,000	4,460	10,800	109	130	151	0.94
Internal watersheds	BV-5	0.14	0.4	2.3	106	107.5	109	0.75
	BV-6	0.5	0.380	3.100	105	106.5	108	0.79
	BV-7	0.415	0.320	2.500	106	107.5	109	0.94
	BV-8	0.150	0.230	1.650	106	107.5	109	1.30
	BV-9	0.760	1.00	3.850	95	97.5	100	0.50

Existing hydraulic structures

According to the hydraulic study conducted by BTE in February 2024 for the solar PV plant, the hydraulic infrastructure consists mainly of transverse structures located under the railway line at the upstream section of the project site, which the railway itself acting like a dam controlling the inflow crossing the site and its eastern and western boundaries. Upstream of the project site, there are several reinforced concrete culverts on the road connecting Menzel Habib with the village of Mhemla, which allow the flow of water from the El Hraiga wadi, the tributaries of the El Oussif wadi and, in particular, diffuse runoff.

Table 7.2 - Characteristics of existing structures in the project area (BTE (2024) hydraulic study, page 11)

Wadi	Location	Type and dimensions of the structure	Condition and observations
El Herriga	Railway (north-eastern boundary of the site)	Two-span bridge 11.6 m each and 3.6 m high + Three Armco pipes Ø2400mm on either side of the bridge	Bridge: Good condition Pipes: Protective covers missing upstream and downstream. Partially clogged
Diffuse flow	Railway track (central part of the site)	Canal (2.0 x 1.0)	Concrete spalling Appearance of steel Partially clogged
Diffuse flow		Canal (2.0x1.0)	
Tributary of the El Oussif wadi	Railway line (north-western boundary of the site)	Two Armco pipes Ø2400mm	Partially clogged



Figure 7.9 - Armco pipe Ø2400 mm and bridge with two spans of 11.6 m each



Figure 7.10 - Bridge with two spans, each with a 11.6 m span



Figure 7.12 - Armco pipe Ø2400 mm on either side of the bridge



Figure 7.11 - Culverts (2.0 x 1.1) under the railway line upstream of the central part of the project site



Figure 7.13 - Ø2400 mm Armco pipes under the railway line installed on the north-western boundaries of the project site

It is important to note that although these hydraulic structures are partially obstructed or deteriorated, their preservation is essential to maintain natural hydraulic continuity and limit the risk of water accumulation during flood periods. Any work carried out in the vicinity must take care not to compromise their integrity or functioning.

7.1.5.2 Hydrogeology

The groundwater resources in the study area consist of two main systems: the Menzel Habib shallow aquifer and the deep aquifer, also referred to as the Sidi Mansour Cretaceous aquifer.

(i) Shallow Aquifer of Menzel Habib

The study area is covered by the Menzel Habib shallow aquifer, which is characterized by high water mineralization (salinity > 6 g/l). The number of wells has changed little from 298 wells in 2010 to 326 wells in 2015. The total resources of this aquifer are estimated at 3.40 Mm³, while the volume actually extracted amounts to 1.50 Mm³, leaving approximately 1.90 Mm³ of available resources. The exploitation rate is therefore 44%, indicating that this aquifer is underexploited. (These data are based on the latest inventory of wells conducted by the DGRE in 2015.)

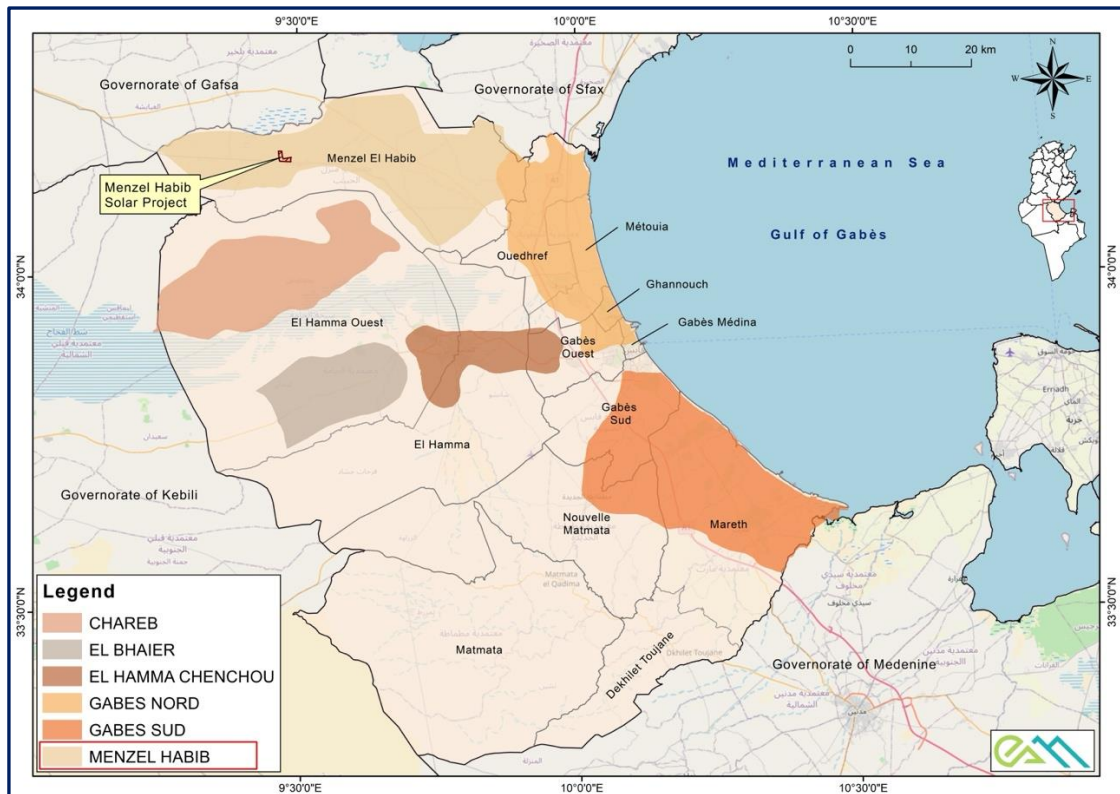


Figure 7.14 - Shallow aquifers map

(ii) Deep aquifer of Menzel Habib

The Menzel Habib deep aquifer, also known as the Sidi Mansour Cretaceous aquifer, has estimated resources of 0.7 Mm³/year, while the volume actually extracted is around 0.26 Mm³/year, with available resources estimated at approximately 0.3 Mm³. The exploitation rate of this aquifer is therefore approximately 37%, indicating that it is underexploited. The water salinity is about 5.15 g/L (DGRE, 2015). At the project site, water is abstracted from depths of approximately 180 m, where salinity can reach up to 6 g/L. According to the DGRE, this aquifer is tapped by five deep boreholes, primarily used for agricultural purposes. (These data are based on the latest inventory of wells conducted by the DGRE in 2015.)

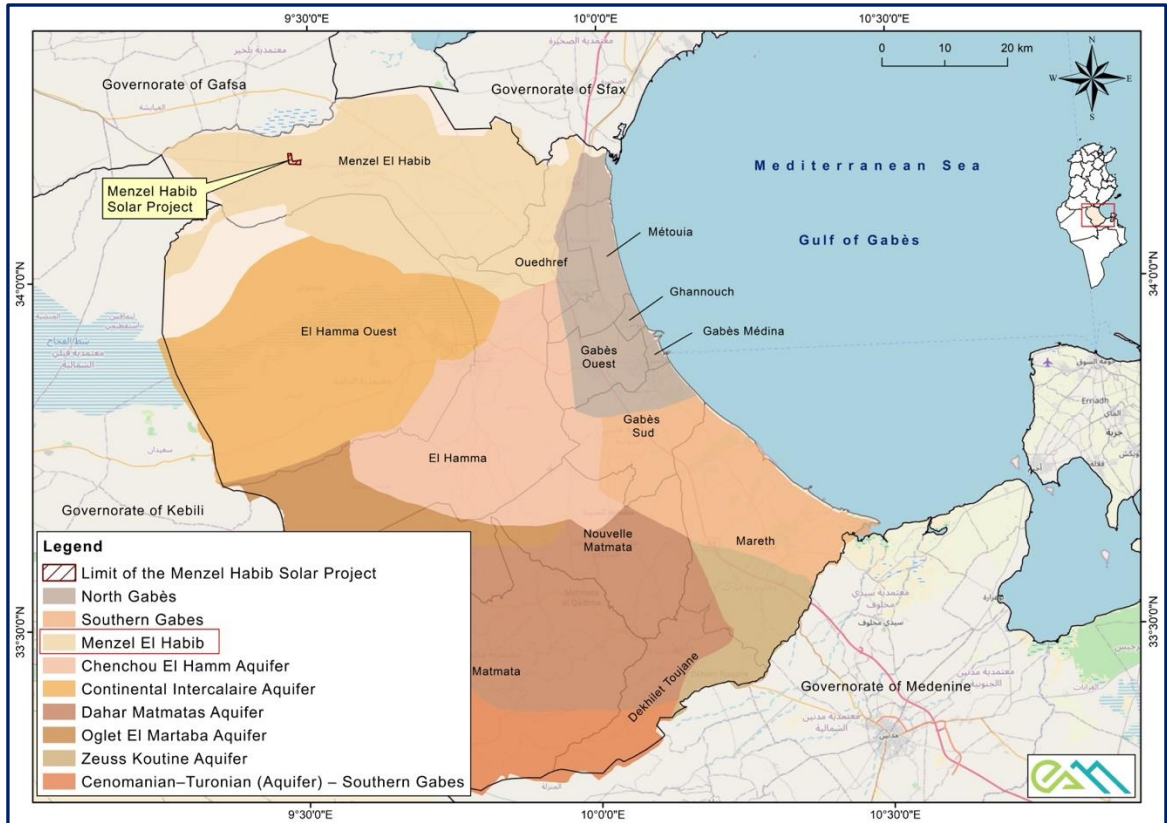


Figure 7.15 - Deep aquifers maps

7.1.6 Natural hazards

7.1.6.1 Seismicity

According to the Medvedev-Sponheuer-Karnik "MSK" scale, which has 12 degrees of intensity ranging from I (not perceptible) to XII (very catastrophic), the Solar PV plant is located in a seismic intensity zone between II and IV according to the Medvedev-Sponheuer-Karnik "MSK" scale. This classification means that the solar PV plant site has low-frequency seismic activity.

7.1.6.2 Lightning

With an average of four (04) lightning strikes per km² per year, the lightning risk at the PV solar plant site is therefore considered low.

7.1.6.3 Fire Risk

The Solar PV plant does not present a fire risk due to the limited and sparse vegetation. No elements likely to cause a fire have been identified. Moreover, the regional history records no fire incidents in this area. In the Gabes Governorate, fires generally occur near oases, where vegetation density is higher, whereas the Menzel Habib area does not present conditions conducive to their outbreak. Furthermore, the site is remote and far from any significant human activity, which considerably reduces the risk of anthropogenic fire.

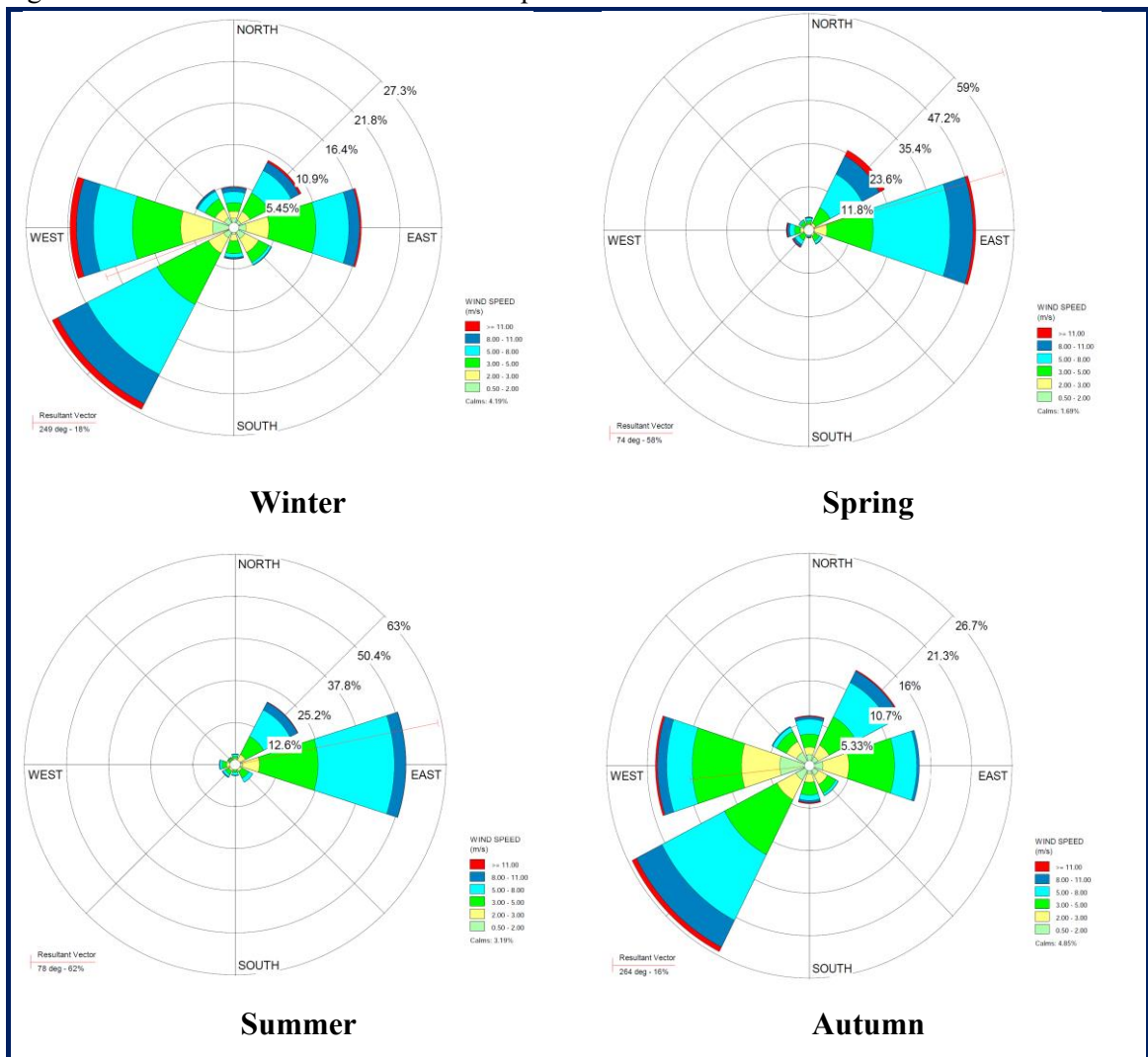
7.1.6.4 High temperature

According to the 2023 climate report from the National Institute of Meteorology (INM), maximum and minimum temperatures in Tunisia were mostly above normal, with an exceptionally high frequency of hot days and nights recorded in July. July 2023 was officially the hottest month ever recorded in Tunisia, with temperatures averaging +4°C above the July norm for the 1991–2020 reference period. Several absolute maximum temperature records were surpassed, with the highest reaching 49.1°C, recorded on July 25 in Gabes. These extreme heat conditions must be carefully considered in the design and operation of the solar PV plant, as they can severely impact the

performance and reliability of electronic components. Prolonged exposure to such high temperatures increases the risk of overheating and electrical malfunctions, potentially leading to unpredictable fire outbreaks. High temperatures also pose health and safety risks to workers on site, including heat stress, dehydration, and heat-related illness

7.1.6.5 Sandstorms

The entire southern region of Tunisia is exposed to sandstorms, a climatic phenomenon characterized by cloudy skies and significantly reduced horizontal visibility, which has a major impact on human activities. Located in the pre-Saharan zone, the Menzel Habib delegation is a good example of this vulnerability. It is also subject to the effects of wind erosion, causes fine particles to be removed by the wind, thereby contributing to the desertification phenomenon. These processes are closely interconnected: the degradation of vegetation cover makes soils more exposed to wind, intensifying erosion and generating sandstorms, which in turn accentuate the loss of organic matter in the soil. Sandstorms can occur throughout the year, but they are generally more intense and frequent during the summer months. The wind regime in the study area over the last decade (2015–2024) is presented in Figures 7.16 and 7.17. The annual wind rose shows a predominance of winds from the East, accounting for 32.4% of observations, with an average annual wind speed of 4.59 m/s. Seasonal variations are notable: in winter, winds predominantly come from the Southwest (26.7%); in spring, from the East (47.9%); in summer, again from the East (50.9%); and in autumn, from the Southwest (26.1%). These patterns demonstrate the significant influence of wind direction and speed on local climatic conditions



1 Social dynamics and desertification: the case of Menzel Habib in southern Tunisia

Figure 7.16 - Seasonal wind frequency rose in the study area

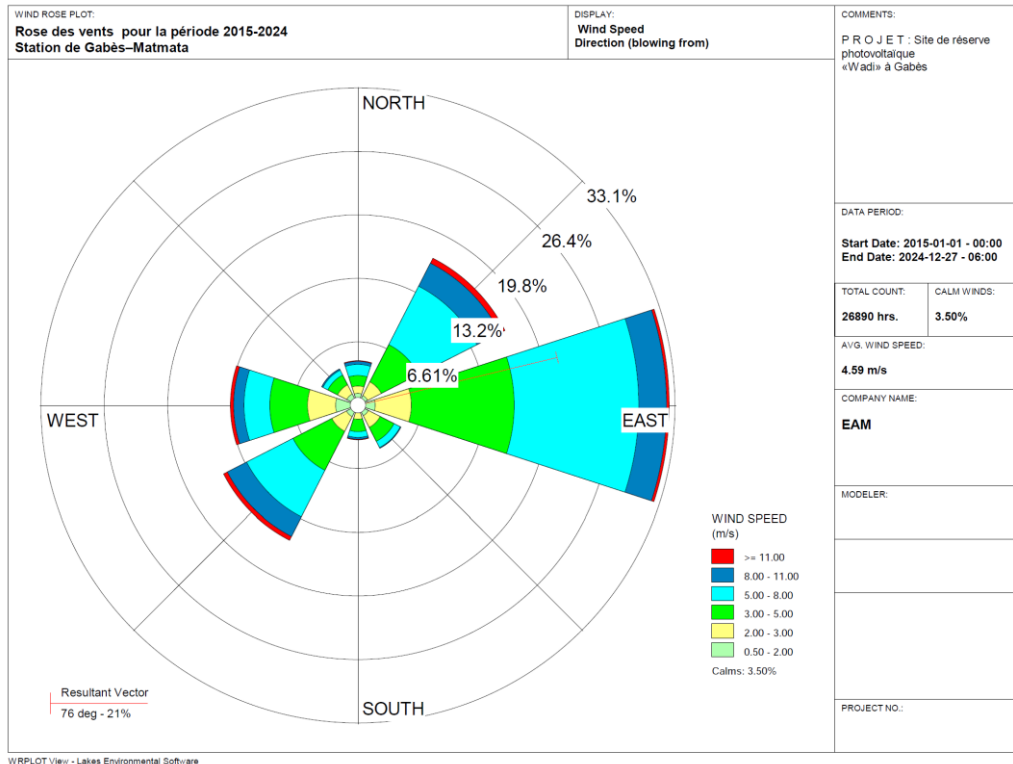
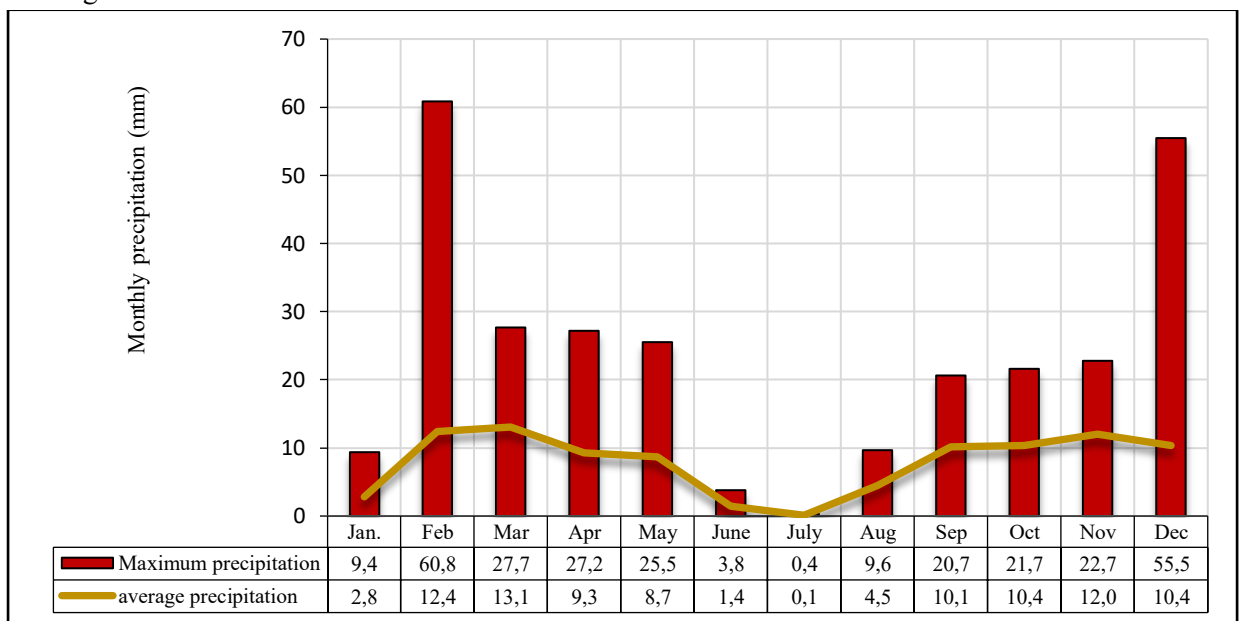


Figure 7.17 - Annual wind frequency rose in the study area

7.1.6.6 Flood risk

According to the hydrological study carried out by BTE in 2024, the Solar PV plant is subject to flood risk, particularly during heavy rainfall. NASA data (2015–2024) indicate that the highest precipitation peak occurs in February, with 60.8mm. This flood risk is mainly linked to the topographical configuration of the site, which is located in a natural depression surrounded by hills, causing water to flow off into lower areas.

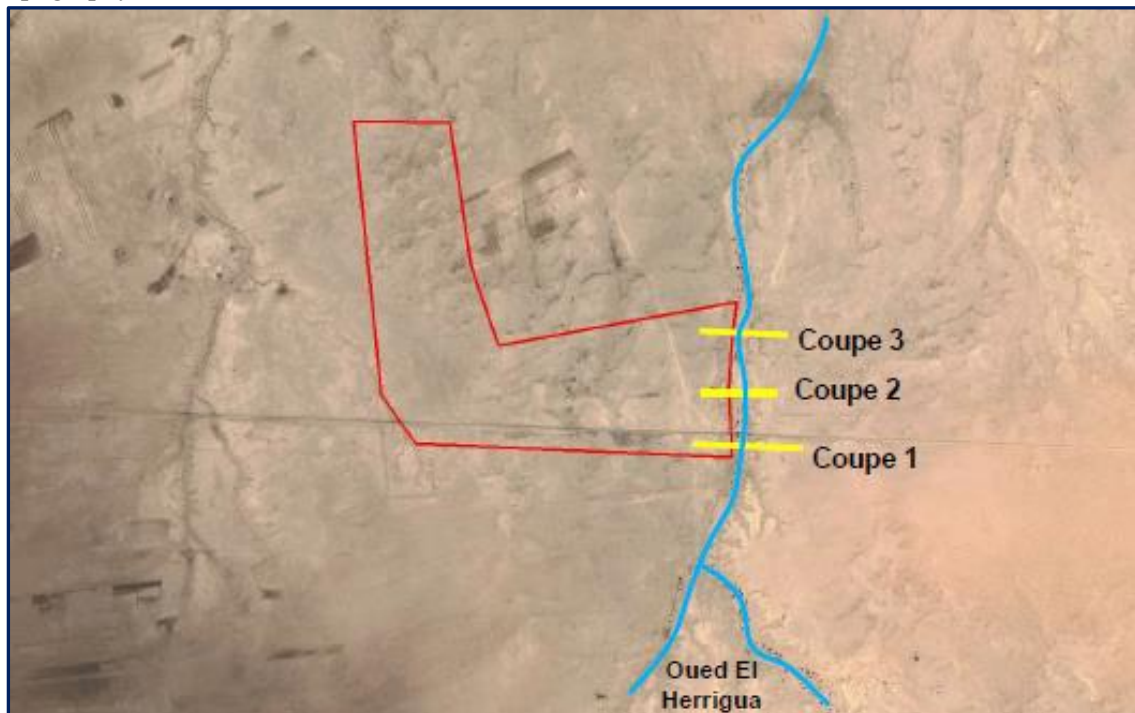


Source : Nasa, 2015-2024

Figure 7.18 - Average and Maximum Monthly Precipitation Recorded in the Study Area

Determination of flood-prone areas along the El Herrigua wadi

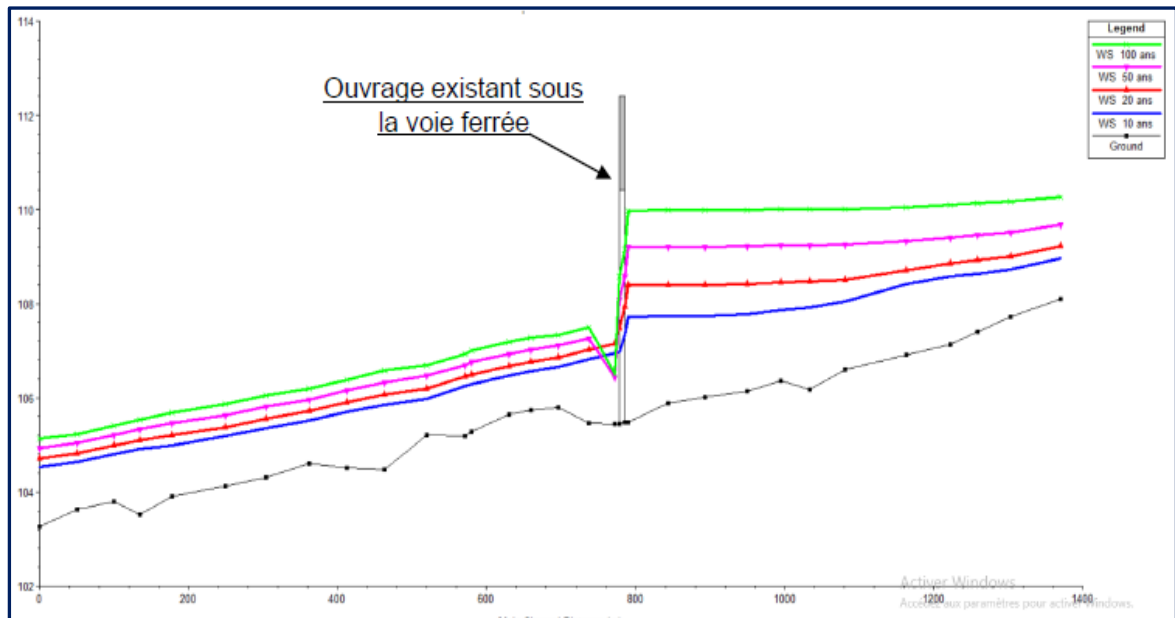
Based on observations made in the field and on sections extracted from the Digital Terrain Model (DTM), the water elevation was gradually adjusted to the level of the cross sections (shown in the figure below). This elevation was then compared to the altitude of the terrain planned for the construction of the future solar PV plant in order to assess the level of flood risk based on the site's topography.



Map produced by BTE

Figure 7.19 - Cross-sections of the terrain

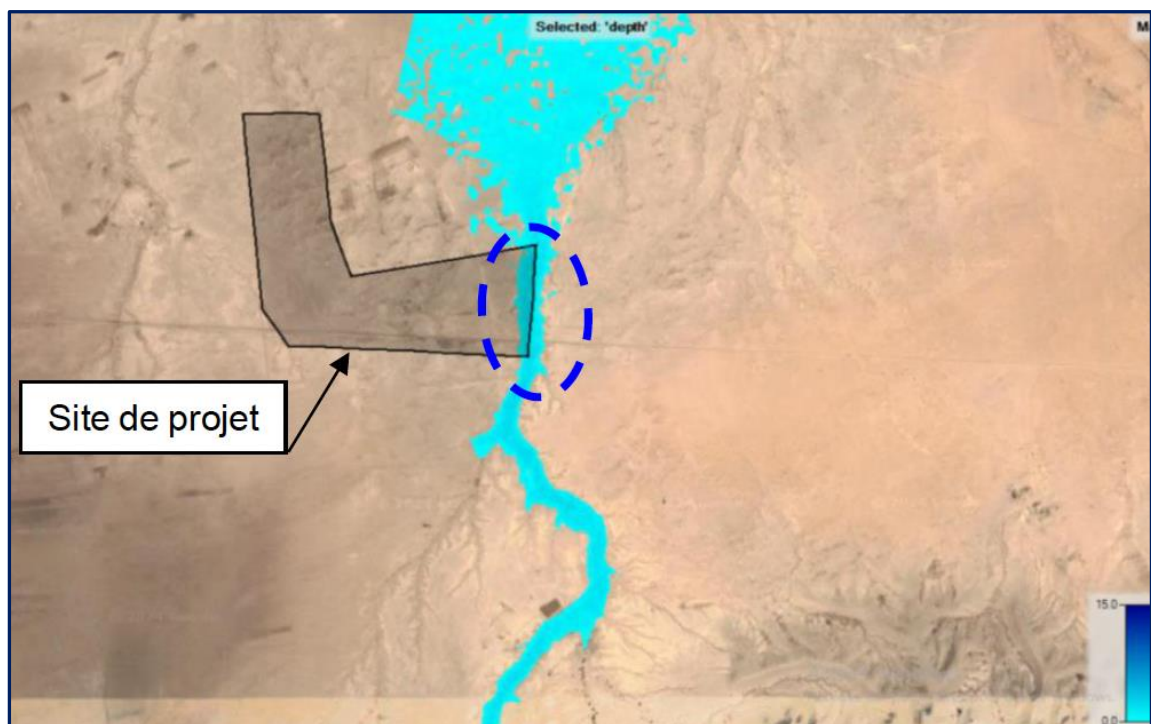
The results of the cross-section analysis and the water line simulation, carried out using the Manning-Strickler formula, indicate that the water elevation at the El Herrigua wadi varies between 1.6 m and 2.0 m, depending on the morphology of the flow. It was found that the width of the flow slightly exceeds that of the minor bed observed in the field, indicating a minor overflow of the wadi towards the site planned for the construction of the solar PV plant. In addition, a one-dimensional (1D) hydraulic model was carried out using HEC-RAS software, from upstream of the railway line to the northeast boundary of the land along the El Herrigua wadi. This modelling is based on thirty (30) cross-sections extracted from the Digital Terrain Model (DTM), also incorporating the existing hydraulic structures under the railway line, namely a bridge and three Armco-type metal culverts ($\text{Ø}2400$ mm). The riverbed, which is locally very wide, varying from 100 to 200 m, becomes significantly smaller as it approaches these structures. This causes a significant rise in the water level immediately upstream of the railway line, increasing the risk of flooding of adjacent land, including the project site. As a result, the existing structure under the railway line reduces the hydraulic section of the wadi, increasing the risk of flooding of the project site.



Profile produced by BTE

Figure 7.20 - Longitudinal profile of the watercourse along the eastern boundaries of the project site

The area susceptible to flooding by the El Herrigua wadi during a hundred-year flood is shown in the figure below by Hec Ras (2D).

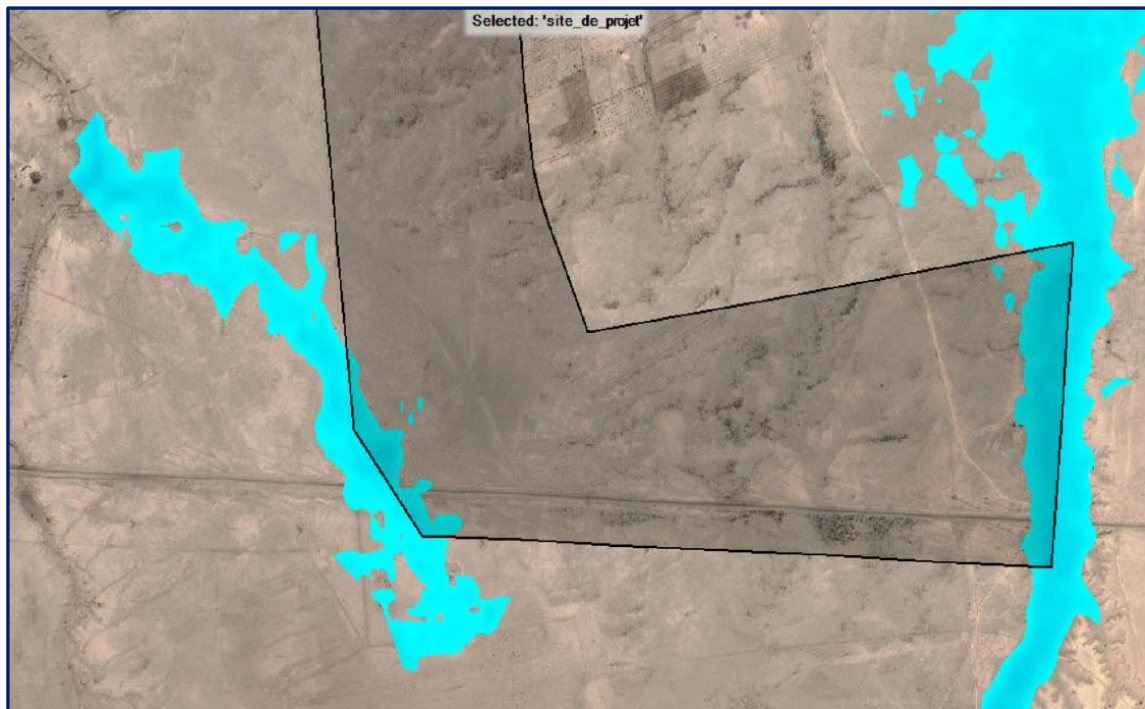


Map produced by BTE

Figure 7.21 - Oued El Herrigua overflow zone

Determination of flood zones by the El Oussif wadi

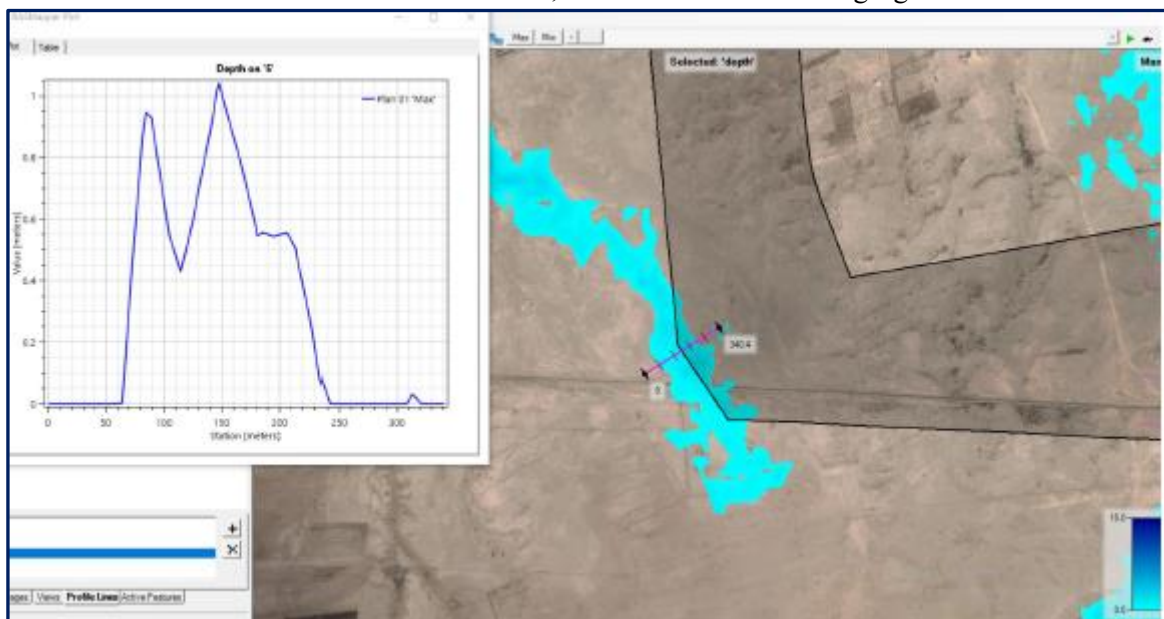
The studied watershed has a relatively small area of 3 km², with a 100-year flood discharge of approximately 35 m³/s. Generally, this type of watershed does not cause overflows, especially since the flow has a significant width of approximately 40m and banks varying from 1 to 1.5m. Two-dimensional (2D) modelling using Hec Ras software provided the following results:



Map produced by BTE

Figure 7.22 - Oued El Oussif overflow area

The figure above shows the overflow of the tributary in certain places towards the project site. The maximum water elevation in the wadi is 1.2 m, as shown in the following figure.



Map produced by BTE

Figure 7.23 - Water elevation at the cross-section downstream of the railway line

It is important to note that the BV-2 and BV-3 watershed generate low water at the Solar PV plant.

Conclusion

In conclusion, the hydrological analysis has highlighted the following points concerning the site planned for the construction of the solar PV plant:

- Oued El Herrigua overflows during a 100-year flood, potentially directly affecting the project area;
- A minor overflow of the El Oussif wadi has also been observed;
- Watersheds BV-2 and BV-3 generate a low water flow and must still be taken into account in

the design of protective structures.

7.1.7 Landscape and Visual impact

The site is relatively isolated and located approximately 2.3 km from El Mehemla village. It is dominated by sparse steppe vegetation. The overall landscape is very homogeneous, with several habitats available around the site. The solar PV plant covers an area of 200 hectares and is located in the pre-desert region of the southern low plains of Tunisia, on mainly flat terrain. However, near the dry wadi that borders the eastern part of the site, the topography is slightly modified by a slope and a few small clayey-sandy hills. The northern part of the site is a large, regular steppe with no significant topographical variations. At the southern end, a high-voltage power line marks the boundary of the site, while the Jebel Beida mountain range rises on the horizon, contrasting with the vast plain. The southern part of the site is also crossed by a bridge and a railway line, where large clumps of *Zizyphus lotus* can be found near the bridge. In conclusion, the site offers no notable viewpoints, presenting a barren landscape that reflects the harsh climatic conditions of the environment. The only visible features from the site include the railway line, the high-voltage power line and the Jebel Beida mountain range to the south of the solar PV plant.

Finally, it should be noted that due to the distance of approximately 2.3 km between the Solar PV plant and the village of El Mehemla, as well as the flat topography of the terrain (the site is not located at a high altitude), no direct view of the solar PV plant is possible from the village. Consequently, there is no risk of glare for the inhabitants of El Mehemla.



Figure 7.24 - Sparse steppe landscape

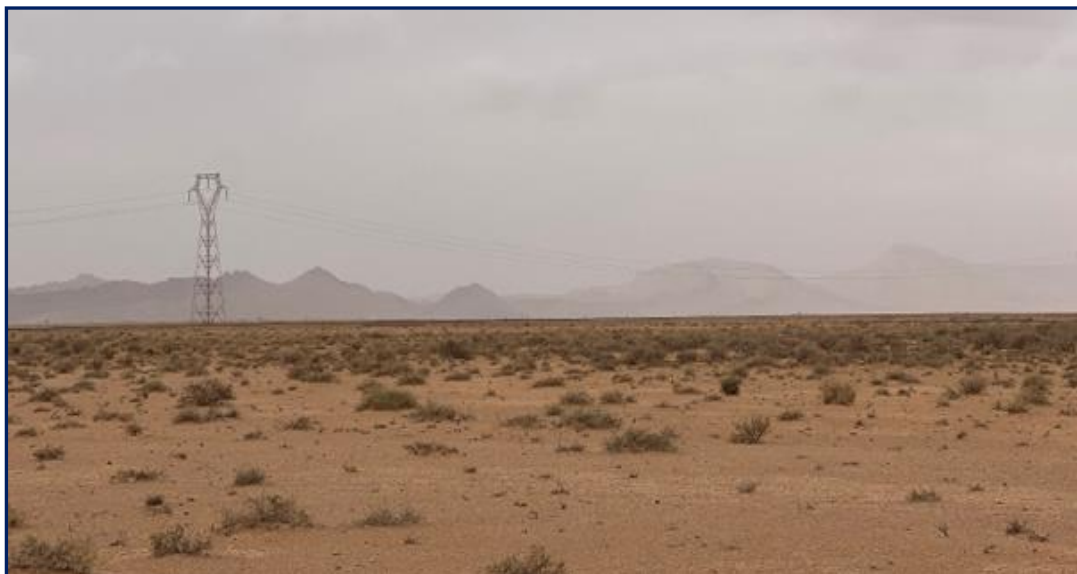


Figure 7.25 - Landscape of the Jebel Beida mountain range

7.1.8 Biodiversity

This section presents a summary of field observations and key ecological findings. Detailed reports on biodiversity (fauna, flora and avifauna) are provided in Appendices.

7.1.8.1 Terrestrial flora

The study of flora aims to characterise the vegetation of the Solar PV plant by analysing its density and floristic diversity. It is based on the use of satellite images and field surveys carried out on 12 May 2023 and 14 February 2025.

(i) Habitat and vegetation

The site is characterised by extensive steppe, dominated by sparse stands of *Astragalus armatus*, *Haloxylon salicornicum* (Hammada), *Anabasis articulata* and *Gymnocarpos decandrus*. In the, near the bridge and hydraulic culverts, large clumps of *Zizyphus lotus* are present.



Figure 7.26 - Clumps of Astragalus (*Astragalus armatus*) in the steppe



Figure 7.27 - Wadi bed with large clumps of Zizyphus lotus near the bridge

(ii) Detailed vegetation of the site

The vegetation in this area is typical of steppic. The vegetation cover is very sparse and plant diversity is moderate. The most common species are *Astragalus armatus* and *Haloxylon salicornicum* (Hammada), followed by *Anabasis articulata* and *Gymnocarpus decandrus*. Clumps of *Zizyphus lotus* are found only in the wadi. A few *Retama raetam* plants appear in the sandier areas. Other taxa are rarer in the steppe and on the edges of the wadi including *Lycium intricatum*, *Rhanterium suaveolens*, *Pituranthos chloranthus*, *Thymus capitatus* and *Peganum harmala*.

In addition to these perennial plant species, several other annual plants appeared after the last rains of the season and were recorded in February 2025 during the second survey of the site. These include: *Euphorbia retusa*, *Adonis microcarpa*, *Asphodelus tenuifolius*, *Diplotaxis harra*, *Enarthrocarpus clavatus*, *Matthiola longipetala* and *Malva parviflora*.

The table below presents the taxonomic list of plant species. The nomenclature used is that of LE Floc'h et al. 2010.

Table 7.3 - Taxonomic list of plants

Family	Genus and species	Common name	IUCN Global	National (LRT / REGNES)
Fabaceae	<i>Astragalus armatus</i>	Wounding Astragalus	NE	NE
	<i>Retama retam</i>	Ragwort	NE	NE
Amaranthaceae	<i>Haloxylon scoparium</i>	Black saline Remth	NE	NE
	<i>Anabasis articulata</i>	Baguel	NE	NE
Caryophyllaceae	<i>Gymnocarpus decander</i>	Gymnocarp	NE	NE
Asteraceae	<i>Rhanterium suaveolens</i>	Rhanterium odorant	NE	NE
	<i>Picris asplenioides</i>	-	NE	NE
Apiaceae	<i>Pituranthos chloranthus</i>	Goddess of childbirth	NE	NE
Amiaceae	<i>Thymus capitatus</i>	Thyme	NE	NE
Solanaceae	<i>Lycium intricatum</i>	Lyciet	NE	NE
Rhamnaceae	<i>Zizyphus lotus</i>	Jujube	NE	NE

Family	Genus and species	Common name	IUCN Global	National (LRT / REGNES)
Zygophyllaceae	<i>Peganum harmala</i>	Wild rue	NE	NE
Euphorbiaceae	<i>Euphorbia retusa</i>	Euphorbia obtusa	NE	NE
Ranunculaceae	<i>Adonis microcarpa</i>	Adonis	NE	NE
Asphodelaceae	<i>Asphodelus tenuifolius</i>	Asphodel	NE	LC
Malvaceae	<i>Malva parviflora</i>	Mallow	NE	NE
Brassicaceae	<i>Farsetia aegyptica</i>	-	NE	NE
	<i>Diplotaxis harra</i>	Diplofaxe	NE	NE
	<i>Enarthrocarpus clavatus</i>	-	NE	NE
	<i>Matthiola longipetala</i>	Matthiole	NE	NE

LRT: Red List of Threatened Flora in Tunisia (Pteridophytes, Gymnosperms, Monocotyledons) 2025.

REGNES: National Register of Threatened Wild Species in Tunisia

NE: Not evaluated according to the IUCN and available national red lists

None of the species listed are reported on national lists (REGNES and Red List of Threatened Flora in Tunisia) or according to the IUCN Red List (2025.1). These are common species with a wide distribution, particularly in the arid areas of Tunisia.



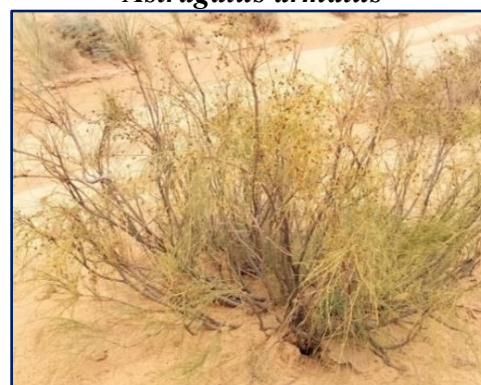
Haloxyton (Hammada) scoparium



Astragalus armatus



Zizyphus lotus



Retama retam

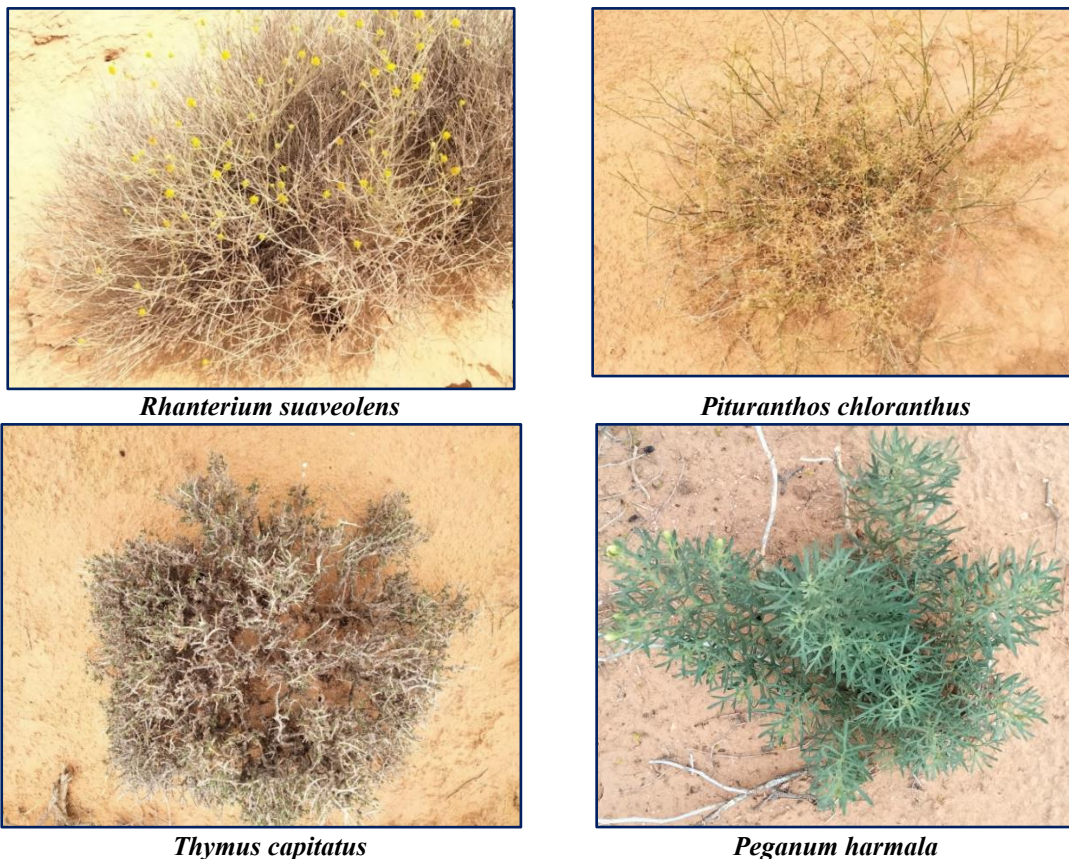


Figure 7.28 - Photos of some of the species recorded

(iii) Vegetation density

In order to analyse the distribution of vegetation cover at the Solar PV plant, detailed mapping was carried out using advanced remote sensing techniques. This study is based on the use of Sentinel-2 satellite images acquired on 8 March 2025 (the date was selected due to optimal weather conditions, with minimal cloud cover), combined with the application of the Normalised Difference Vegetation Index (NDVI), a key tool for assessing vegetation density and health. The NDVI measures the difference between the reflectance of visible light (red) and near-infrared light, two wavelengths that clearly distinguish vegetated areas from non-vegetated surfaces.

The NDVI was calculated using the Red (Band 4, 665 nm) and Near Infrared (Band 8, 842 nm) bands, allowing the site to be segmented into different categories of vegetation cover, based on their density and geographical distribution across the site. The results show the site’s vegetation cover is generally very sparse, which is typical of arid steppe environments. More specifically, 59.9% of the surface area consists of bare soil, 35.7% has low vegetation, 3.7% has medium-density vegetation, while only 0.7% is covered by dense vegetation. This dense vegetation is located in the southern part of the site, near the railway, where local climatic conditions are slightly more favorable due to relative humidity associated with Punctual water flow in the wadis. These remote sensing results are confirmed during the field surveys, which confirmed the sparse steppe vegetation pattern and the presence of denser vegetation in the southern sector. Although this area does not contain any plant species classified as vulnerable, the developer has therefore decided to exclude it from the installation of photovoltaic panels.

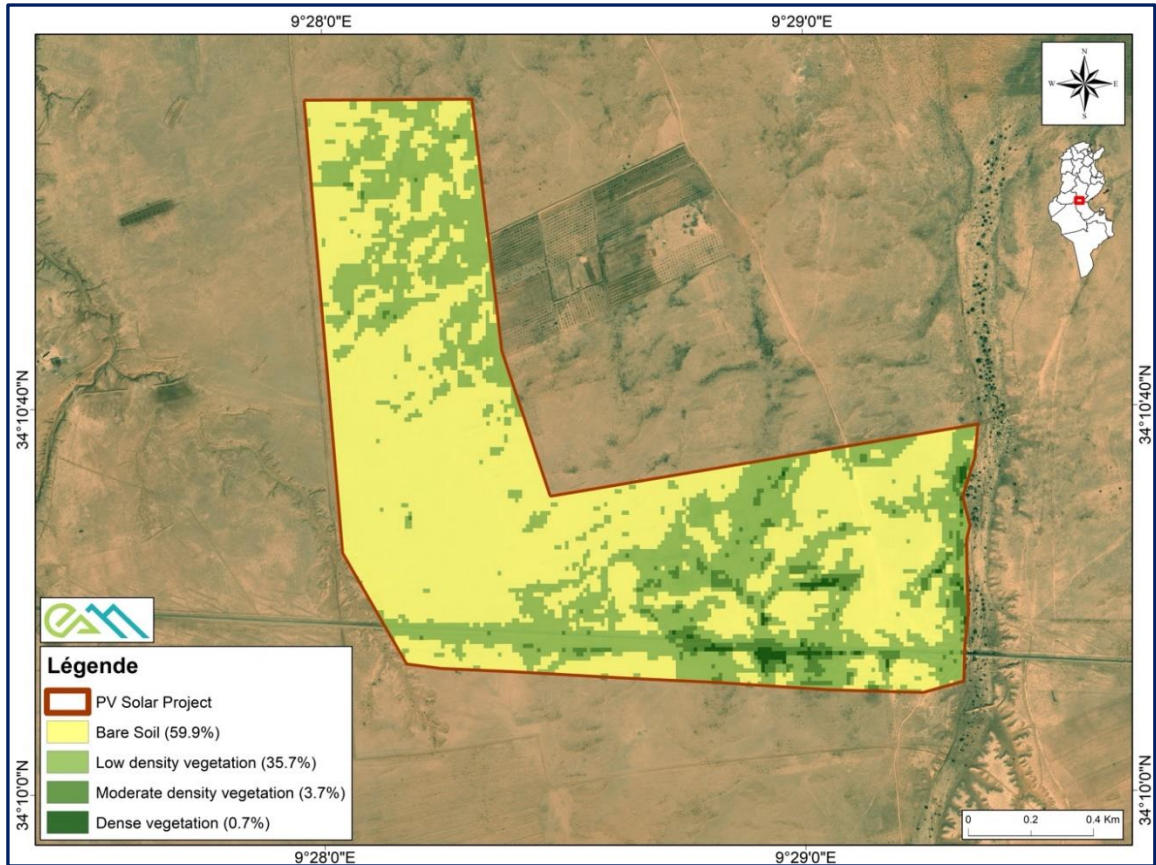


Figure 7.29 - Vegetation density map

7.1.8.2 Fauna

(i) Molluscs

Given the dryness and lack of water, only one species of mollusk is well adapted to this environment. This is the gastropod *Sphincterochila candidissima*, which is locally very abundant in places, forming small colonies around *Astragalus* plants. its conservation status is Least Concern (LC) according to the IUCN Red List (2025.1).



Figure 7.30 - Shells of *Sphincterochila candidissima*

(ii) Arthropods

- *Insects*: Eleven insect species have been found in this steppe environment: three ants (1 Cataglyphis and 2 Messor); seven beetles and one Mantidae Eremiaphilidae. None of the species recorded are considered threatened according to the IUCN Red List (version 2025.1). However, *Eremiaphila denticollis tunetana* is a subspecies endemic to the arid areas of southern Tunisia. It is important to mention that *Eremiaphila denticollis tunetana* is widespread and well represented across the arid areas of Tunisia, suggesting no specific management measures are required.

Table 7.4 - Taxonomic list of insects

Order	Species
Hymenoptera (ants)	<i>Cataglyphis sharae</i>
	<i>Messor semoni</i>
	<i>Monomorium salomonis</i>
Coleoptera	<i>Timarcha sp.</i>
	<i>Erodius lefrancii</i>
	<i>Pimelia grandis</i>
	<i>Pimelia confusa</i>
	<i>Sphenoptera pharao</i>
	<i>Adesmia dilatata</i>
	<i>Blaps sp.</i>
Mantids	<i>Eremiaphila denticollis tunetana</i>



Messor semoni



Monomorium salomonis



Adesmia dilatata



Erodius lefrancii



Sphenoptera pharao



Eremiaphila denticollis

Figure 7.31 - Insects observed at the Solar PV plant

- Scorpions: Only one species, *Androctonus australis*, was observed. This is a venomous species commonly found in arid areas of North Africa.



Figure 7.32 - *Androctonus australis*

(iii) Reptiles

The reptile inventory identified several species adapted to steppe conditions. The diurnal lizard *Mesalina olivieri* was observed active in May 2023 and February 2025. During the February 2025 surveys, two species of nocturnal Gekkonidae, *Stenodactylus mauritanicus* and *Tropiocolotes tripolitanus*, were found under stones, while a tarantula, *Tarentola fascicularis*, was spotted on adjacent land. In addition, an agamid, *Trapelus mutabilis*, was captured in February 2025 on sandy-gravelly soil near the entrance to the village of El Mehempla. Other reptiles are potentially present in this habitat, including, skinks, snakes, and venomous species such as the horned viper (*Cerastes cerastes*) and possibly the cobra (*Naja haje*), whose presence remains to be confirmed. However, the site seems unsuitable for cobras, which generally prefer rocky and stony terrain near mountain. All of these species, whether present or likely to exist, are classified as Least Concern (LC status) according to the Red List of Amphibians and Reptiles of the Mediterranean (IUCN, 2005). None are known to be protected at the national or global level.

Table 7.5 - Taxonomic list and conservation status of reptiles (Species observed (Obs.) and/or likely to exist)

Order	Family	Genus & species English & Latin names	Status IUCN
Sauria	Varanidae	The desert monitor <i>Varanus griseus</i>	LC
	Agamidae	The Variable Agamidae <i>Trapelus mutabilis</i> (Obs.)	LC
	Gekkonidae	The spotted gecko <i>Stenodactylus mauritanicus</i> (Obs.)	LC
		The Tropicolotes <i>Tropicolotes tripolitanus</i> (Obs.)	LC
	Phyllodactylidae	The banded gecko <i>Tarentola fascicularis</i> (Obs.)	LC
	Lacertidae	The olive-tailed skink <i>Mesalina olivieri</i> (Obs.)	LC
		The Acanthodactyl <i>Acanthodactylus boskianus</i>	LC
Scincidae	Boulenger's Seps <i>Chalcides boulengeri</i>	LC	
Ophidians	Lamprophiidae	The Psammophis <i>Psammophis schokari</i>	LC
		The Moilah snake <i>Malpolon moilensis</i>	LC
	Viperidae	The horned viper <i>Cerastes cerastes</i>	LC
	Elapidae	The cobra <i>Naja haje</i>	LC



Mesalina olivieri



L'Agame Trapelus mutabilis



Stenodactylus mauritanicus



Tropicolotes tripolitanus

Figure 7.33 - Reptiles observed at the Solar PV plant

(iv) Mammals

Several rodent burrows were observed in the steppe, particularly around tufts of vegetation, sandy mounds and along the embankments bordering wadi and the bridge. These burrows are likely to be occupied by various species, such as gerbils, meriones, jerboas and, above all, sand rats (*Psammomys obesus*).

Gerbils and meriones burrow are dispersed throughout the steppe. In contrast, sand rat burrows are more localised, mainly at the base of vegetation clumps and at the foot of *Ziziphus lotus*. The sand rat feeds mainly on the leaves and stems of *Retama* and *Baguel*. Several holes dug by canids (foxes or wolves) in search of sand rats have been observed on these slopes.

In addition to these rodents (sand rats, jerboas, gerbils and meriones) and canids (foxes and wolves), whose presence is certain, a few other mammals are likely to live in this biotope, such as the *Lepus*

capensis and the hedgehog. A piece of skin from a desert hedgehog (*Paraechinus aethiopicus*) was found on the neighbouring land in February 2025. In the neighbouring areas, particularly near the nearest mountain range, the Goundi (*Ctenodactylus gundi*), Porcupine (*Hystrix cristata*), Zorille (*Ictonyx libycus*) and a few species of bats are likely to be found. These species, which are mainly rock-dwelling, are closely associated with the rock formations, fissures, crevices and caves characteristic of plateaus and mountains. With the exception of the Goundi, which remains strictly confined to rocky environments, the other species can also be observed in valleys, wadis, steppes and fields bordering the high plateaus, where they search for food.

The list of species likely to exist is given in the table below. It was compiled from the literature (CHETOUI, in press, and EL FARHATI *et al.*, 2019). All these species are classified as LC according to the IUCN (2025.1). with the exception of *Gerbillus latastei*, which is classified as DD (Data Deficient).

Table 7.6 - Taxonomic list of mammals likely to exist on the site

Order	Family	English name Genus & species	IUCN Status
Lagomorpha	Leporidae	The Cape Hare <i>Lepus capensis</i>	LC
Rodents	Muridae	The field gerbil <i>Gerbillus campestris</i>	LC
		The Lataste's Gerbil <i>Gerbillus latastei</i>	DD
		Simon's gerbil <i>Gerbillus simoni</i>	LC
		Shaw's Merion <i>Meriones shawi</i>	LC
		The Sand Rat <i>Psammomys obesus</i>	LC
	Dipodidae	The Great Jerboa <i>Jaculus orientalis</i>	LC
Insectivores	Erinaceidae	The Desert Hedgehog <i>Paraechinus aethiopicus</i>	LC
Carnivores	Canidae	The red fox <i>Vulpes vulpes</i>	LC
		The Golden Wolf <i>Canis anthus</i>	LC



Terriers de Gerbilles



Galeries et terriers du rat de sable *Psammomys obesus*



Trous creusés par des canidés à la recherche des rats de sable



Morceau de peau d'un Hérisson de désert

Figure 7.34 - Traces of mammals at the Solar PV plant

7.1.8.3 Conclusion

- The biodiversity of the El Mehemla - Menzel Habib steppe is generally moderately rich in plant and animal species due to the spatial homogeneity of the area and the lack of habitat diversity.
- The site shows around ten species of perennial steppe plants characteristic of arid areas and other annual herbaceous plants recorded in February 2025 after the last rains.
- According to the analysis of the distribution of vegetation cover at the Solar PV plant: 59.9% of the site consists of bare soil, 35.7% has sparse vegetation, 3.7% has medium vegetation density and only 0.7% of the site is covered by dense vegetation.
- The of the identified fauna are ubiquitous and widely distributed in Tunisia.
- The invertebrate fauna is represented by a common gastropod, about ten insect species, and a venomous scorpion typical of arid environments, *Androctonus australis*.
- Other venomous species are also likely to occupy the site, such as the horned viper (*Cerastes cerastes*).
- The vertebrate group is represented by several species of diurnal and nocturnal lizards; many rodent burrows and signs of the presence of desert hedgehogs and canids (wolf or fox) have been spotted.
- No taxa are considered rare, vulnerable or endangered. However, among the arthropods, and more particularly among the insects, a mantid, *Eremiaphila denticollis*, represented by the endemic subspecies *E. d. tunetana*, has been identified on the site. It is important to mention that *Eremiaphila denticollis tunetana* is widespread and well represented across the arid areas of Tunisia

7.1.9 Avifauna

The avifauna study is based on an in-depth assessment of ornithological issues, focusing on several key criteria such as species abundance status (occasional, rare, frequent, common), their conservation status according to the IUCN, and their functional ecology (water birds, raptors, passerines). This study takes into account both sedentary and migratory bird species, with particular attention to threatened or vulnerable species.

Two ornithological surveys were conducted during 2025. The first took place on 14 February 2025, a period marking the transition between wintering and the start of spring migration, as well as the onset of passerine nesting. These conditions provided optimal opportunities for identifying the majority of species present, whether sedentary or early post-nuptial migrants. Favourable ecological conditions were further enhanced by the abundant rainfall recorded that year, which encouraged the early appearance of birdsong in the steppe grasslands of southern Tunisia.

The period corresponding to the ornithological survey carried out on 14 February 2025 marks the transition between wintering and the start of spring migration, as well as the start of passerine nesting. This period provides optimal conditions for identifying the majority of species present, whether sedentary or early post-nuptial migrants. In addition, the abundant rainfall recorded this year has created favourable ecological conditions, encouraging the early appearance of birdsong in the steppe grasslands of southern Tunisia.

The second survey was conducted on 20 August 2025, during the autumn migration period, using the transect method. This approach allowed systematic coverage of the surrounding steppe grasslands, which dominate the southern Tunisian landscape, and provided a representative overview of the avifaunal community closely associated with these habitats, as well as the detection of both resident species and potential migratory movements.

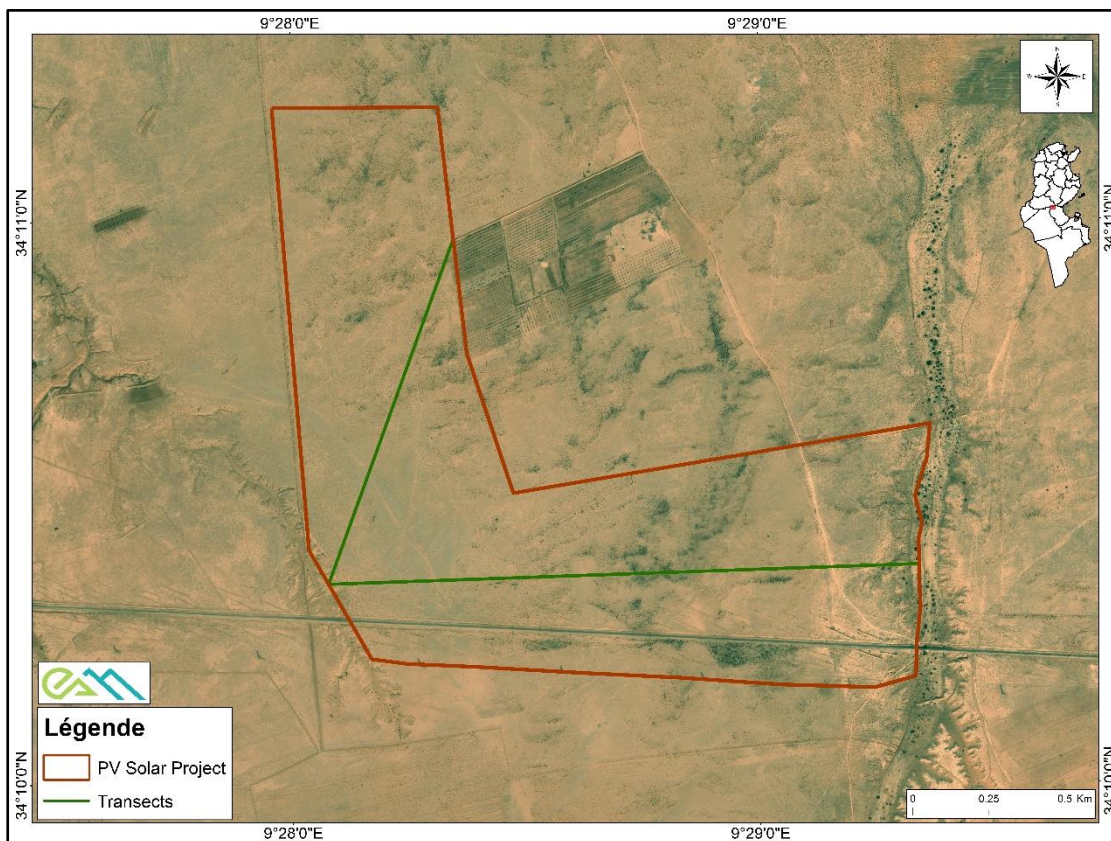


Figure 7.35 - Transects within the Solar PV plant

Results of the investigations and ornithological issues

Ornithological investigations carried out on 14 February 2025 at the Solar PV plant identified 12 bird species belonging to eight families, including three rare species, three frequent species and six common species. The table below lists the birds observed, along with their overall status according to the IUCN (2025.1) and their national status.

Table 7.7 - List of birds observed on 14/02/2025

Species	Migratory status	IUCN Red List	
		Global (IUCN, 2025)	National (Hamdi et al, 2021)
COLUMBIDES			
Rock pigeon <i>Columba livia</i> ****	NS	LC	LC
Laughing Dove <i>Spilopelia senegalensis</i> ****	NS	LC	LC
ALAUDID			
Pispolette <i>Alaudala rufescens</i> ****	NS	LC	LC
Crested lark <i>Galerida cristata</i> ****	NS	LC	LC
Thekla's Lark <i>Galerida theklae</i> **	NS	LC	LC
Greater Short-toed Lark <i>Calandrella brachydactyla</i> ****	NS	LC	LC
MUSCICAPIDAE			
Desert Wheatear <i>Oenanthe deserti</i> ***	NM	LC	LC
SYLVIIDES			
Sardinian Warbler <i>Curruca melanocephala</i> **	NS	LC	LC
SCOTOCERCIDAE			
Streaked Scrub-Warbler <i>Scotocerca inquieta</i> ***	NS	LC	LC
LANIIDES			
Southern Grey Shrike <i>Lanius meridionalis</i> **	NS	VU	VU

Species	Migratory status	IUCN Red List	
		Global (IUCN, 2025)	National (Hamdi et al, 2021)
CORVID			
Common raven <i>Corvus corax</i> ****	NS	LC	LC
STURNIDAE			
Spotless Starling <i>Sturnus unicolor</i> ***	NS	LC	LC

(*) Occasional species – (**) Rare species – (***) Frequent species - (****) Common species(- (NS) sedentary breeder – (NM) migratory breeder – (VP) passage visitor – (HI) winter visitor - Conservation status according to the National Red List (HAMDI & al., 2021) and global bird list (IUCN, 2025 :) (<https://www.iucn.org/resources/conservation-tools/iucn-red-list-threatened-species>) (.)

The observations, focused on the wintering season, the beginning of the spring migration and the nesting period of songbirds, primarily identified mainly sedentary breeding species that are well adapted to the anthropogenic environment. These species are highly ecologically plastic, enabling them to adapt to changes in their habitats. They are mainly associated with the grasslands of pre-desert environments, which are widespread in the pre-Saharan areas of southern Tunisia, where the landscape is very homogeneous and similar habitats are widely available around the site.

The most represented families are the *Alaudidae* (Greater Short-toed Lark, crested lark, Thekla lark), *Muscicapidae* (desert wheatear), *Laniidae* (southern grey shrike) and *Scotocercidae* (Streaked Scrub-Warbler). No raptors or waterbirds were observed on the site, indicating that there are no major ornithological issues. However, one species classified as "Vulnerable" (VU) on the IUCN Red List and on the national list was identified: the southern grey shrike.



Figure 7.36 - Southern Grey Shrike

The surveys carried out on 20 August 2025 revealed the presence of only eleven bird species, including one raptor (Long-legged Buzzard), Common Ravens, and nine small sedentary passerine breeders. No autumn migration movements were identified during this visit.

Table 7.8 - List of birds observed on 20/08/2025

Species	Migratory status	IUCN Red List	
		Global (IUCN, 2025)	National (Hamdi et al, 2021)
ALAUDIDAE			
Crested Lark <i>Galerida cristata</i> ***	NS	LC	LC
Greater Short-toed Lark <i>Calandrella brachydactyla</i> **	NS	LC	LC
Lesser Short-toed Lark <i>Alaudala rufescens</i> ****	NS	LC	LC
MUSCICAPIDAE			
Desert Wheatear <i>Oenanthe deserti</i> **	NM	LC	LC
Western Black-eared Wheatear <i>Oenanthe moesta</i> **	NS	LC	LC
SCOTOCERCIDAE			
Streaked Scrub Warbler <i>Scotocerca inquieta</i> **	NS	LC	LC

Species	Migratory status	IUCN Red List	
		Global (IUCN, 2025)	National (Hamdi et al, 2021)
LANIIDAE			
Great Grey Shrike <i>Lanius excubitor</i> **	NS	LC	LC
HIRUNDINIDAE			
Barn Swallow <i>Hirundo rustica</i> ***	NM	LC	LC
ACCIPITRIDAE			
Long-legged Buzzard <i>Buteo rufinus</i> **	NS	LC	NT
CORVIDAE			
Common Raven <i>Corvus corax</i> **	NS	LC	LC
COLUMBIDAE			
Eurasian Collared Dove <i>Streptopelia decaocto</i> **	NS	LC	LC

(*) Occasional species – (**) Rare species – (***) Frequent species - (****) Common species(- (NS) sedentary breeder – (NM) migratory breeder – (VP) passage visitor – (HI) winter visitor - Conservation status according to the National Red List (HAMDI & al., 2021) and global bird list (IUCN, 2025) (<https://www.iucn.org/resources/conservation-tools/iucn-red-list-threatened-species/>).

Overall, the observed bird community is known to be strongly associated with the grasslands that dominate the southern part of the steppe region in Tunisia. Based on these results, the potential ornithological issues are negligible, particularly as these birds are most often anthropophilic species, cosmopolitan to human activities, and therefore easily adaptable to habitat disturbance. Moreover, the surrounding landscape, being homogeneous, offers numerous alternative habitats where grassland birds can easily relocate.

Conclusion

- The preliminary survey conducted on 14 February 2025 at the Solar PV plant did not reveal any major ornithological issues, particularly during the considered phenological season.
- A total of 12 bird species belonging to 8 families were recorded, including 3 rare species, 3 frequent species, and 6 common species
- No raptors or waterbirds were observed on the site, indicating that there are no major ornithological issues.
- One species classified as "Vulnerable" (VU) on the IUCN Red List and on the national list was identified: the southern shrike.
- A second survey, conducted on 20 August 2025 during the autumn migration period using the transect method, revealed only 11 bird species, including one raptor, Common Ravens, and nine small sedentary passerines. No signs of autumn migration were detected during this visit.
- One species classified as “Near Threatened” (NT) on the National red list was identified: the Long-legged Buzzard.
- Overall, the bird community is mainly linked to steppe grasslands, composed of adaptable, anthropophilic species with access to alternative habitats

7.1.10 Protected areas

Digital and cartographic data published by the IUCN (<http://www.keybiodiversityareas.org/kba-data>), Birdlife International (<http://datazone.birdlife.org/site/search>) and national authorities (Directorate General of Forests and Ministry of Equipment and Housing) within a 5 km radius of the project site reveals the presence of a single natural ecosystem of conservation interest. This is the Sebkhet Sidi Mansour, which is included on the Ramsar list of wetlands. During rainy years, it irregularly hosts contingents of migratory waterbirds, with some species exceeding 1% of their original biogeographical population, including certain taxa threatened with extinction (Marbled teal *Marmaronetta angustirostris*, white-headed duck *Oxyura leucocephala* and ferruginous duck *Aythya nyroca*). As for water birds, the almost permanent drying up of the Sebkha greatly reduces its attractiveness, except in exceptionally rainy years when a few hundred individuals may temporarily stay there.



Figure 7.37 - General view of Sebkhet Sidi Mansour, classified as a Ramsar site (EAM photos, July 2025)

However, the general geographic context indicates that it is practically impossible for waterbird exchanges to occur between the solar PV plant and this conservation-important wetland. Indeed, these two partially anthropized ecosystems have very different ecological conditions and capacities, which categorically prevent waterbird movements between them. Furthermore, the Sebkhet Sidi Mansour provides abundant and readily available trophic and spatial resources for this taxonomic group, reducing the need for them to move elsewhere in search of food or suitable shelter.

As per IUCN–CEPF (Critical Ecosystem Partnership Fund) report on the Sebkhet of Sidi Mansour²:

- The Sebkhet Sidi Mansour is very poorly studied, and most information remains qualitative and not supported by quantitative ecological data. Reliable inventories of flora, fauna, hydrology, and land use are still lacking. Despite its inclusion in the Ramsar list and recognition as an Important Bird Area (IBA), the site does not currently benefit from structured or effective management plans.
- The IUCN study further notes that the civil society and institutional involvement is weak, and collaboration mechanisms between CRDA services, research institutions, and local associations remain underdeveloped.

² IUCN - Centre de Coopération pour la Méditerranée (2014). *Analyse de l'information sur le Parc National de l'Ichkeul à Bizerte et la Sebkha Sidi Mansour à Gafsa et renforcement de leur partenariat avec les institutions de recherche et les organisations de la société civile en Tunisie*. Rapport final, projet CEPF « Renforcement des connaissances et des statuts de protection et de gestion des Zones Clés pour la Biodiversité (ZCB) ». Malaga, Espagne : IUCN. 92 p.

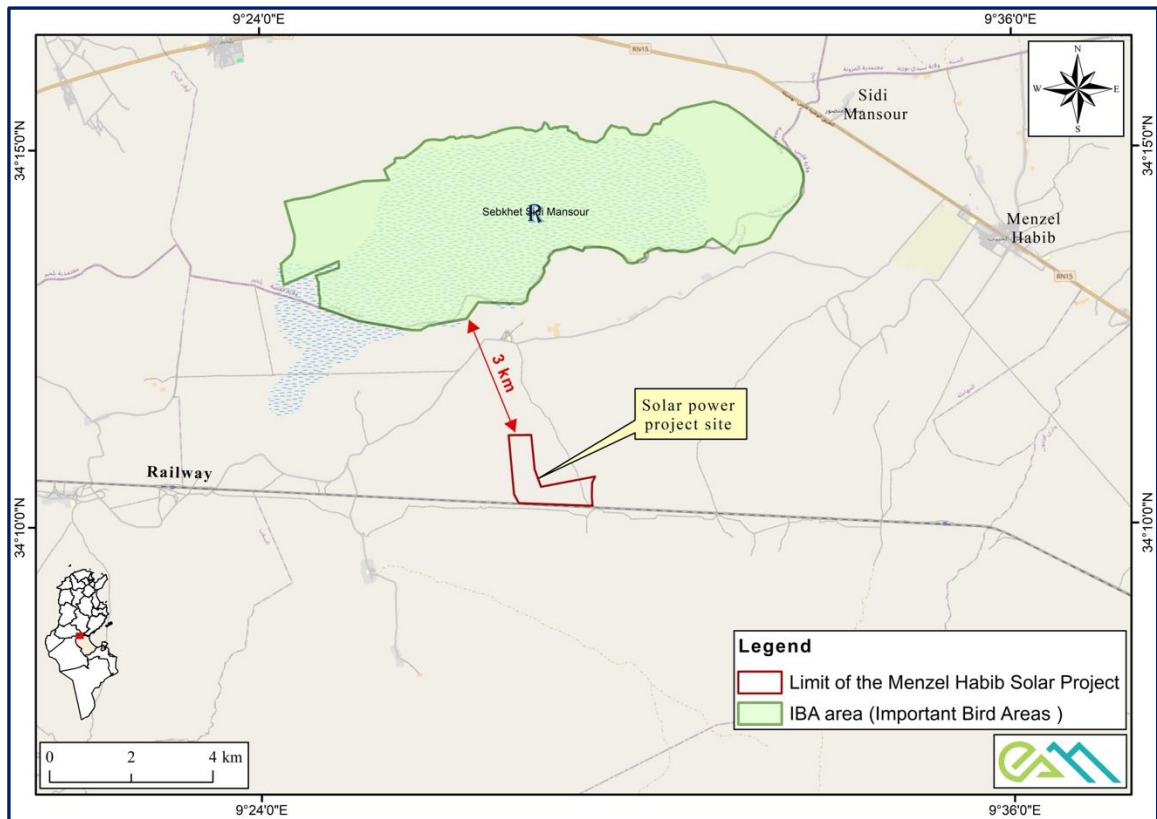


Figure 7.38 - Location map of Sebkheth Sidi Mansour (RAMSAR site)

Conclusion

- The study of the general geographical context shows that it is impossible for waterbird exchanges to occur between the solar PV plant and Sebkheth Sidi Mansour (RAMSAR site).

7.1.11 Species of conservation interest

This section provides an overview of species of conservation interest confirmed or potentially present in the project area and assesses their potential to trigger Critical Habitat (CH) or to be classified as Priority Biodiversity Features (PBFs), in accordance with the following requirements:

- IFC Performance Standard 6 (PS6, 2012)
- EBRD Environmental and Social Requirement 6 (ESR6, 2024)

Species were identified based on the following criteria:

- Their confirmed or potential presence in the project area;
- Their conservation status according to the IUCN Red List (version 2025.1) and the national red list;
- Their potential to meet the criteria for designation as Critical Habitat, as defined by the IFC (PS6, 2012) and EBRD (ESR6, 2024) guidelines;
- Their classification as Priority Biodiversity Features (PBF) according to the EBRD's ESR6.

Highly mobile, occasional or transient species with no proven ecological dependence on the site (e.g. large mammals with a wide distribution) are excluded, given the limited ecological and spatial footprint of the project.

Criteria for Critical Habitat (IFC PS6 and EBRD ESR6)

The table below summarises the criteria used to assess eligibility for designation as a Critical Habitat, based on the quantitative and qualitative thresholds defined in IFC PS6 and EBRD ESR6:

Criterion	IFC PS6	EBRD ESR6	Trigger threshold
1. Endangered species	Criterion 1	Criterion ii	≥ 0.5% of the global population and ≥ 5 breeding units of a CR or EN species; or VU species whose habitat loss would result in a deterioration of its conservation status; CR/EN species listed on national red lists in accordance with IUCN standards.
2. Endemic or restricted range species	Criterion 2	Criterion iii	≥ 10% of the global population and ≥ 10 breeding individuals of a species with a global range ≤ 50,000 km ² .
3. Migratory or gregarious species	Criterion 3	Criterion iv	The site supports ≥ 1% of the global population of the species on a cyclical or regular basis; or ≥ 10% during periods of environmental stress.
4. Unique or highly threatened ecosystems	Criterion 4	Criterion i	The site represents ≥ 5% of the global extent of an ecosystem classified as EN or CR (according to IUCN or equivalent national assessments).
5. Key evolutionary processes	Criterion 5	Criterion v	The site supports ecological or geological features that promote species diversity or genetic uniqueness.
6. Ecological support functions	—	Criterion vi	The site provides ecological functions essential to the viability of CH-qualified species or habitats (e.g., corridors, seasonal refuges, feeding areas).

The criteria relating to unique or highly threatened ecosystems, key evolutionary processes, and ecological support functions are considered not applicable in the context of this project. The site is located in an arid pre-Saharan steppe, characterised by a simple, poorly diversified and highly degraded ecological structure. No part of the study area corresponds to a rare or irreplaceable ecosystem or to an essential ecological function such as a seasonal refuge or critical breeding area.

Priority Biodiversity Features (EBRD ESR6)

In accordance with EBRD ESR6, a broader category of Priority Biodiversity Features (PBF) recognises species or habitats of conservation value that do not meet the Critical Habitat criteria but still warrant special attention. PBF criteria include:

- Threatened habitats
- Vulnerable species (Vu)
- Protected areas (ICONIC, ZCB, Ramsar sites or other areas identified by national authorities or stakeholders)
- Ecological structures and functions essential for maintaining biodiversity (e.g. nesting sites, seasonal feeding areas).

Conclusion

Based on the results of field surveys and the biodiversity assessment in the project area, no species classified as Critically Endangered (CR) or Endangered (EN) on the IUCN Red List (version 2025.1) or on recognised national red lists were observed. No ecosystems identified within the area of influence correspond to highly threatened or unique ecosystems. As detailed in Chapter 7 (Environmental Baseline Conditions), the site supports species assemblages characteristic of arid pre-Saharan steppe habitats and is therefore representative of this ecosystem type. At the same time, it is ecologically degraded due to long-term grazing pressure, soil erosion, and sparse vegetation cover, which have reduced its structural complexity and overall habitat quality. Consequently, the site does not support any known key evolutionary processes or irreplaceable ecological functions. However, some species observed in the area meet the definition of Priority Biodiversity Features (PBF) according to EBRD's ESR6. Notably, southern grey shrike (*Lanius meridionalis*), classified as Vulnerable (VU) at both the global (IUCN, 2025) and national levels (Hamdi et al., 2021). This species is regularly observed in southern Tunisia and, according to recent observations by national

ornithological experts, the situation of this species appears to be improving, particularly due to the abundance and availability of suitable spatial and trophic resources around the project site. Based on the data collected, no significant concentration of individuals or breeding units has been identified, and the trigger thresholds for the Critical Habitat criterion have not been reached. In addition, the Long-legged Buzzard (*Buteo rufinus*), although assessed as Least Concern (LC) globally, is classified as Near Threatened (NT) at the national level and is therefore also considered a PBF under ESR6. The Tunisian endemic species *Eremiophila denticollis tunetana* has been observed. Although it has a limited range, the threshold for triggering the Critical Habitat criterion has not been reached, with only one individual observed. However, it is considered a PBF according to ESR6. No significant concentrations of migratory or endemic species, migration corridors or seasonal aggregation areas have been identified. However, these ornithological findings remain specific to the winter season, the beginning of the spring migration and the start of passerine nesting. Further investigations are scheduled during autumn migration period 2025.

In conclusion, the project area does not meet the Critical Habitat criteria according to IFC PS6 or EBRD ESR6. However, it is home to three species considered Priority Biodiversity Features (PBFs): the Southern Grey Shrike (*Lanius meridionalis*), the Long-legged Buzzard (*Buteo rufinus*), and the endemic *Eremiophila denticollis tunetana*.

7.2 **Environmental Baseline Conditions for the existing 150 kV TL (400 km)**

7.2.1 **Climate**

- Based on the climatic characteristics defined by Emberger (1955), the existing 150 Kv TL is located in the lower arid bioclimatic zone.
- Over the last decade (2014-2023), the average annual temperatures observed in the study area were approximately 23.1°C in Gafsa and 21°C in Gabès
- During the same period, average annual rainfall was 69.3 mm in Gafsa and 95.2 mm in Gabès, confirming the arid nature of the climate.
- Relative humidity ranged from 28% to 62% in Gafsa and from 38% to 63% in Gabès.

7.2.2 **Natural regions**

The existing 150 kV transmission line traverses two distinct natural regions. Its initial section crosses the southern low plains, characterized by extensive areas of sedimentary formations of alluvial and eolian origin. As it continues southeast, the existing 150 kV transmission line reaches Jeffara, a broad coastal plain that gently slopes toward the sea.

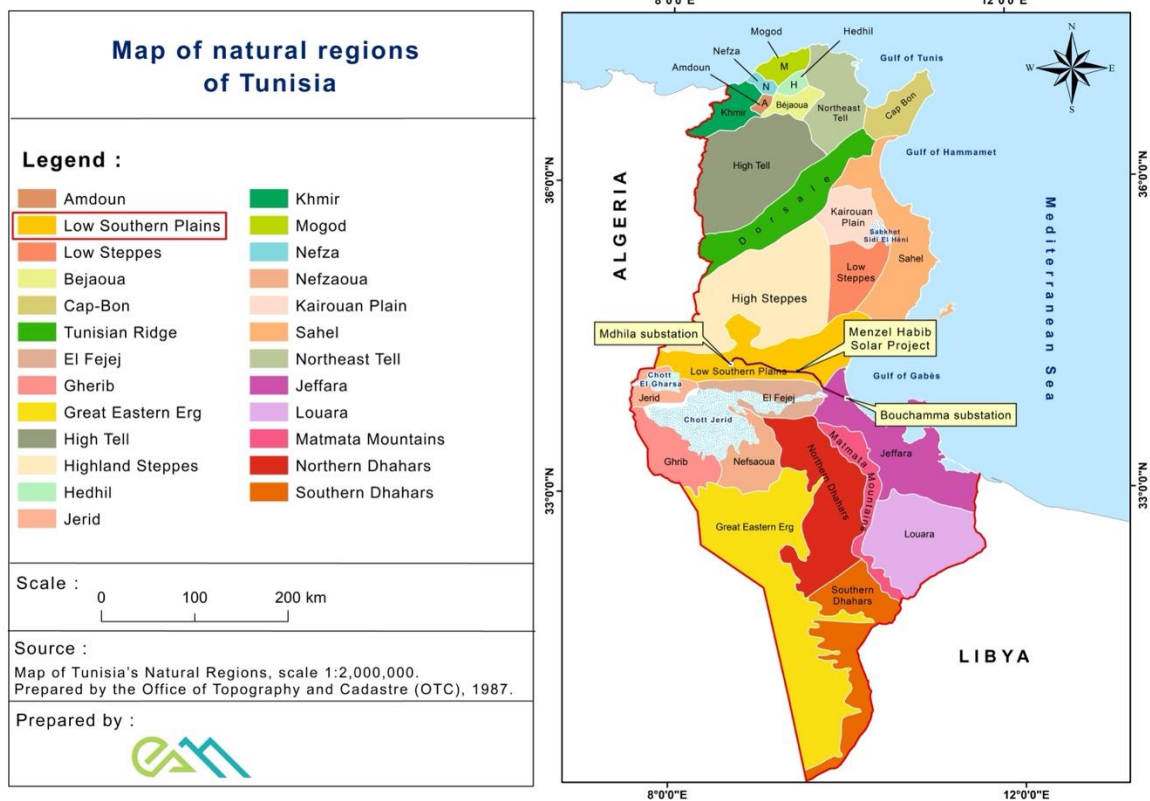


Figure 7.39 - Map of natural regions in the study area

7.2.3 Geomorphology - topography

The existing 150 kV transmission line crosses a mosaic of contrasting geomorphological units from the Mdhilla region to the Bouchamma region. This route alternates between closed depressions, extensive plains, and piedmont areas, reflecting significant morphological heterogeneity along the existing 150 kV TL corridor

- Around the Mdhilla region: the existing 150 kV transmission line begins near Mdhilla, in an area characterized by ridges mainly oriented NE–SW, with altitude ranging from 250 to 350 m. The geomorphology is dominated by dissected hills, remnants of erosion affecting marl and sandstone formations. These features indicate active morphogenic dynamics in a semi-arid context, influenced by both wind and water erosion (Ben Ayed, 1986; Zargouni, 1985).
- South of Chott El Guettar: the existing 150 kV TL runs along the southern edge of Chott El Guettar, a tectonically formed closed depression. This area consists mainly of salt flats and gypsum crusts, reflecting an evaporitic context typical of endorheic zones. The terrain is flat to very gently sloping, with localized clayey badlands. The altitude is approximately 250 m (Boukadi, 1994).
- Segui-Zograta Plain (mentioned in section 7.1.4.3 Geomorphology - Topography of solar PV plant)
- Northeast of Sebkhet Hamma: the existing 150 kV transmission line crosses the northern edge of Sebkhet Hamma, a saline Sebkha depression where soils are saturated with salts, featuring salt and gypsum crusts. The area is characterized by low topography (the altitude is around 50 m) and a strong influence of evaporation and salt accumulation processes
- Around the Bouchamma region: in the Bouchamma area, the existing 150 kV transmission line crosses gently sloping glaciais facing the sea. These slopes are composed of cobbles, ancient and recent alluvium, and are punctuated by intermittent wadis with temporary flow. The region represents a transition zone towards the coastal plains, with elevations ranging between 40 and 50 m.

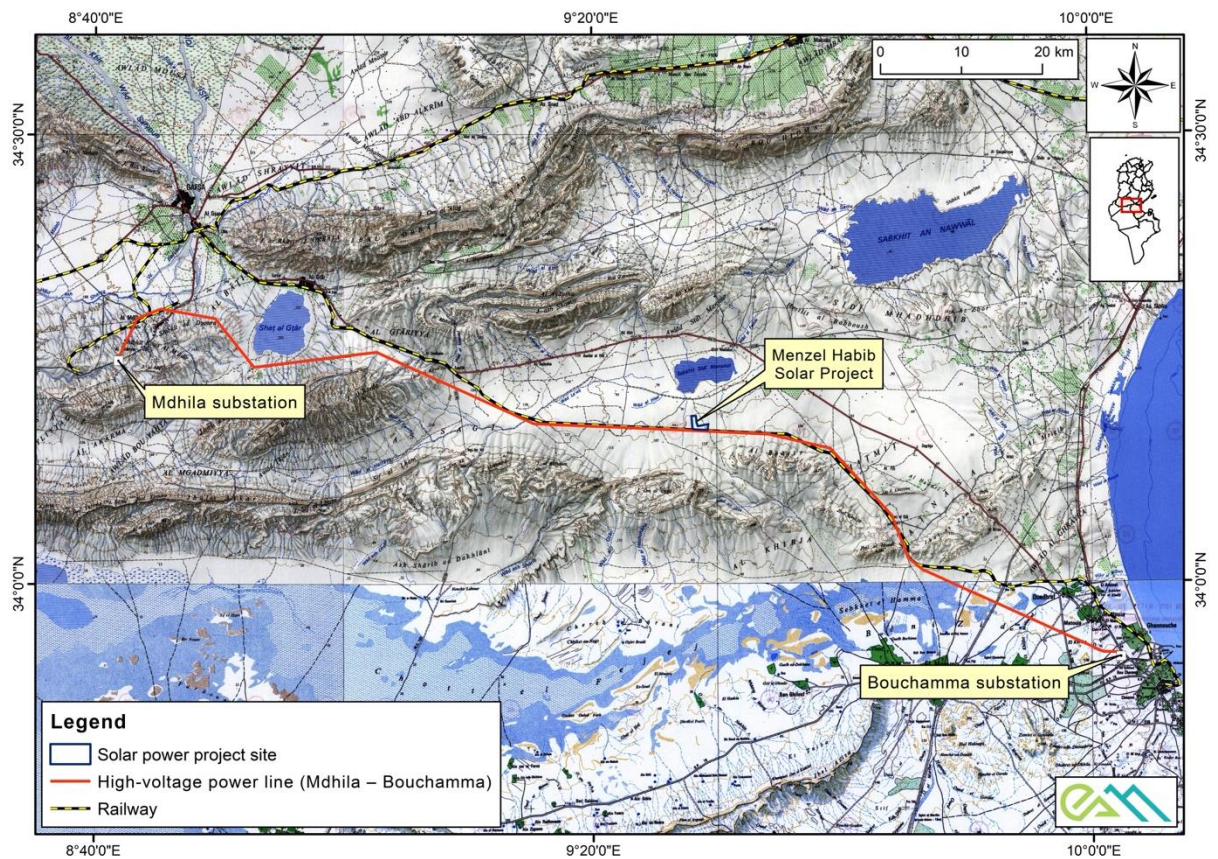


Figure 7.40 - Topographic map

7.2.4 Vegetation and Floristic Diversity along the Existing Transmission Line

The existing 150 kV TL crosses several plant communities identified from the vegetation map. These formations reflect the floristic diversity of the region’s arid and halophilic environments. The plant communities encountered are as follows:

- *Moricanda arvensis* variant, in association with *Zygophyllum album* and *Anarrhinum brevifolium*, with a localized appearance of *Stipa tenacissima*;
- Sub-association of *Diploaxis harra*, in association with *Arthrophytum schmittianum* and *Thymelaea microphylla*;
- Moderately to highly halophilic community dominated by *Salicornia* sp. pl., *Arthrocnemum indicum*, *Halocnemum strobilaceum*, and *Halopeplis amplexicaulis*;
- Association of *Anabasis aphylla* and *Suaeda mollis*;
- Association of *Hedysarum carnosum* and *Peganum harmala*;
- Association of *Zygophyllum album* and *Anarrhinum brevifolium*;
- Sub-association of *Erodium glaucophyllum*, in association with *Artemisia herba-alba* and *Arthrophytum scoparium*;
- Sub-association of *Ononis natrix* ssp. *falcata*, in association with *Zygophyllum album* and *Anarrhinum brevifolium*.

These plant formations demonstrate the adaptation of species to harsh soil and climatic conditions. However, vegetation is generally very sparse throughout the area crossed by the existing transmission line.

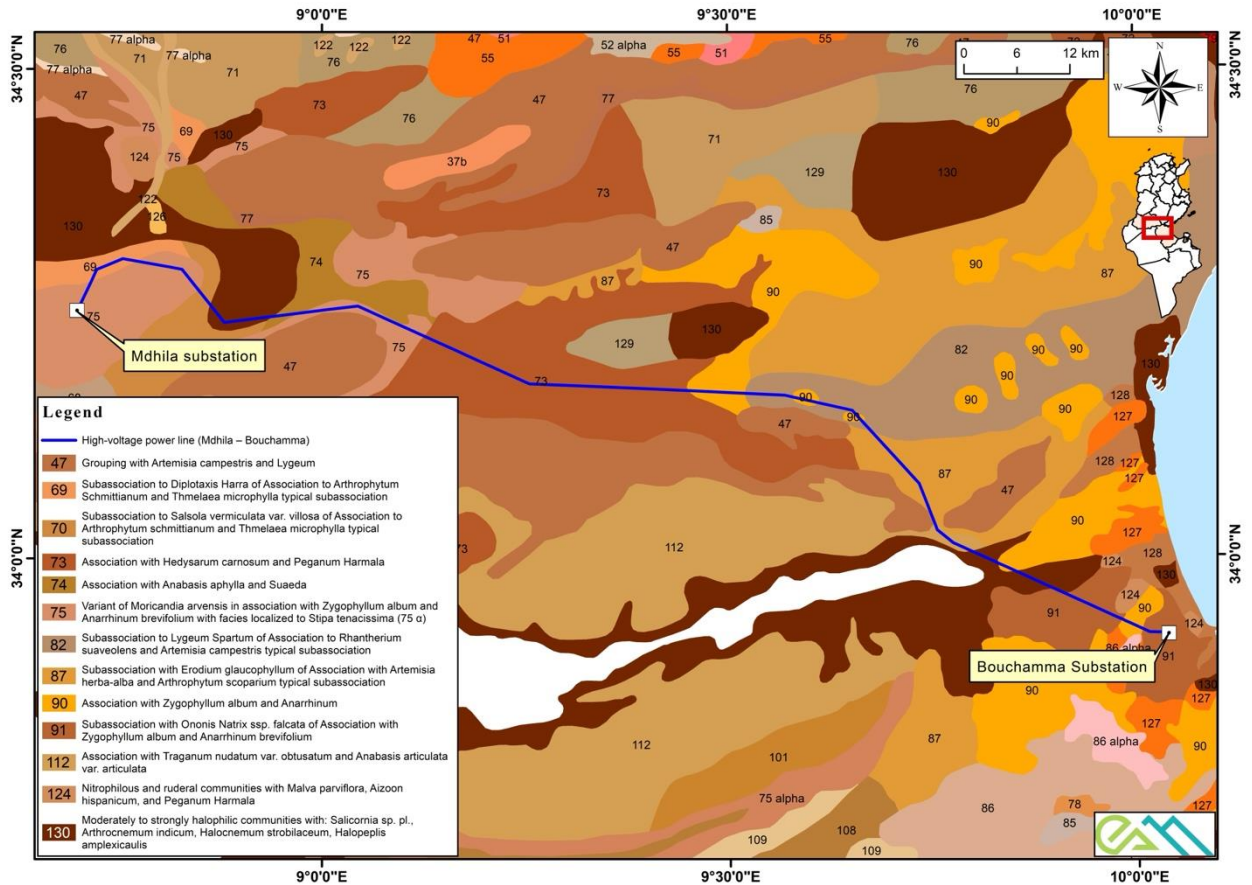


Figure 7.41 - Vegetation map

7.2.5 Avifauna

In order to compile an exhaustive inventory of the avifauna along the existing 150 kV transmission line of the Bouchamma- Mdhilla, a three-day observation campaign was carried out on August 21, 22, and 23, 2025. In phenological terms, this campaign covers the beginning of the autumn migration season. The species likely to be observed are sedentary birds, migratory breeders, and early autumn migrants.

Following this campaign, the minimum species richness recorded was 41 species belonging to different functional groups, namely 7 species of raptors, 2 species of waterbirds, 4 species of columbids, one species of corvid, and 27 species of passerines. Among this population, only one species is endemic to North Africa, namely Traquet halophile – *Oenanthe halophila*.

Of the 41 species recorded along the TL, eight are of national or global conservation concern. The table below shows the species observed, their migration status in Tunisia, their global conservation status according to the IUCN Red List (2025) and their national status (Hamdi et al., 2021).

Table 7.9 - List of species observed along the 150 kV exiting TL – Bouchamma – Mdhilla 21-23 August 2025

Species (French name)	Statut	IUCN Red List	
		Global (IUCN, 2025)	National (Hamdi et al, 2021)
SCOTOCERCIDAE			
Dromouque vif-argent – <i>Scotocerca inquieta</i> ***	NS	LC	LC
SYLVIIDAE			
Fauvette orphée – <i>Curruca hortensis</i> **	NM	LC	LC
Cisticole des joncs – <i>Cisticola juncidis</i> **	NS	LC	LC
Hypolaïs obscure – <i>Iduna opaca</i> **	NS	LC	LC
ALAUDIDAE			
Cochevis huppé – <i>Galerida cristata</i> ****	NS	LC	LC
Cochevis de Thékla – <i>Galerida theklae</i> ***	NS	LC	LC
Alouette des champs – <i>Alauda arvensis</i> **	NS	LC	VU
Alouette calandrelle – <i>Calandrella brachydactyla</i> ***	NS	LC	LC
Alouette piskolette – <i>Alaudala rufescens</i> ***	NS	LC	LC
Alouette bilophe – <i>Eremophila bilopha</i> **	NS	LC	LC
Ammomane isabelline – <i>Ammomanes deserti</i> ***	NS	LC	LC
Sirli du désert – <i>Alaemon alaudipes</i> **	NS	LC	LC
Alouette calandre – <i>Melanocorypha calandra</i> **	NS	LC	LC
LANIIDAE			
Pie grièche grise – <i>Lanius excubitor</i> ***	NS	LC	LC
Pie grièche à tête rousse – <i>Lanius senator</i> **	NS	LC	LC
MUSCICAPIDAE			
Traquet de désert – <i>Oenanthe deserti</i> ***	NM	LC	LC
Traquet à tête grise – <i>Oenanthe moesta</i> ***	NS	LC	LC
Traquet halophile – <i>Oenanthe halophila</i> **	NS	LC	LC
Traquet rieur – <i>Oenanthe leucura</i> ***	NS	LC	LC
Gobemouche gris – <i>Muscicapa striata</i> **	NM	LC	LC
CERCOTRICHIDAE			
Agrobate roux – <i>Cercotrichas galactotes</i> **	NM	LC	LC
TURDIDAE			
Merle noir – <i>Turdus merula</i> **	NS	LC	LC
LEIOTHRICHIDAE			
Cratérope fauve – <i>Argya fulva</i> **	NS	LC	NT
EMBERIZIDAE			
Bruant du Sahara – <i>Emberiza sahari</i> ***	NS	LC	LC
PASSERIDAE			
Moineau espagnol – <i>Passer hispaniolensis</i> ****	NS	LC	LC
FALCONIDAE			
Faucon lanier – <i>Falco biarmicus</i> **	NS	LC	EN
Faucon crécerelle – <i>Falco tinnunculus</i> **	NS	LC	VU
ACCIPITRIDAE			
Buse féroce – <i>Buteo rufinus</i> **	NS	LC	NT
Circaète Jean-le-blanc – <i>Circaetus gallicus</i> *	NS	LC	CR
STRIGIDAE			
Chevêche d'Athéna – <i>Athene noctua</i> *	NS	LC	LC
CORVIDAE			
Grand corbeau – <i>Corvus corax</i> ****	NS	LC	LC
UPUPIDAE			
Huppe fasciée – <i>Upupa epops</i> ***	NS	LC	LC
STURNIDAE			
Étourneau unicolore – <i>Sturnus unicolor</i> ****	NS	LC	LC
COLUMBIDAE			
Pigeon biset – <i>Columba livia</i> ****	NS	LC	LC
Tourterelle des bois – <i>Streptopelia turtur</i> ***	NS	VU	VU
Tourterelle turque – <i>Streptopelia decaocto</i> ***	NS	LC	LC

Species (French name)	Statut	IUCN Red List	
		Global (IUCN, 2025)	National (Hamdi et al, 2021)
Tourterelle maillée – <i>Spilopelia senegalensis</i> ***	NS	LC	LC
APODIDAE			
Martinet pâle – <i>Apus pallidus</i> ****	NM	LC	LC
HIRUNDINIDAE			
Hirondelle rustique – <i>Hirundo rustica</i> ****	NM	LC	LC
CHARADRIIDAE			
Courvite isabelle – <i>Cursorius cursor</i> *	NS	LC	VU
BURHINIDAE			
Ædicnème criard – <i>Burhinus oedicnemus</i> *	NS	LC	LC

(**) Occasional species – (**) Rare species – (***) Frequent species - (****) Common species(- (NS) sedentary breeder – (NM) migratory breeder – (VP) passage visitor – (HI) winter visitor - Conservation status according to the National Red List (HAMDI & al., 2021) and global bird list (IUCN, 2017 :)
<https://www.iucn.org/resources/conservation-tools/iucn-red-list-threatened-species>)

The bibliographic compilation showed that only large birds that are directly affected by electrolocation, namely birds of prey (*Faucon lanier*, *Faucon crécerelle*, *Buse féroce*, *Circaète jean le blanc* and *Chevêche d'Athène*), Corvids (*Grand corbeau*), Columbidae (Pigeon biset and Tourterelle Turque) and large wading birds (*Courvite isabelle* and *Ædicnème criard*). In this context, surveys show that the risk of electrocution is greater for five relatively vulnerable species that have been observed in direct contact with 48 of the 188 pylons surveyed (an overall percentage of 25.5%). These are three different populations that use the pylons as nesting sites (30/188), namely the Faucon lanier (5/188), the Buse féroce (2/188) and the Grand corbeau (23/188). The remaining pylons surveyed are used as roosts/perches by these species as well as two columbids (Pigeon biset and Tourterelle des bois), with an overall figure of 18/188. These ornithological findings highlight the importance of these electrical installations for strengthening existing populations, particularly raptors, corvids and sedentary columbiformes in the region covered by the high-voltage line in question. In order to limit the potential impact on these wild populations, it is crucial to avoid any work on the pylon used by bird during the summer nesting season, which runs from mid-March to the end of July each year.

Table 7.10 -List of pylons used by large-winged breeding birds

Ordre	Pylon number	Breeding species	Pylons used by birds
1	P1	PB	Perchoir
2	P5	BF	Nesting support
3	P8	GC	Perchoir
4	P9	BF	Perchoir
5	P10	GC	Nesting support
6	P12	GC	Perchoir
7	P13	GC	Perchoir
8	P15	GC	Perchoir
9	P20	GC	Perchoir
10	P21	BF (juvenile)	Perchoir
11	P24	GC + PB (cadaver)	Nesting support
12	P30	GC	Nesting support
13	P39	GC	Nesting support
14	P41	GC	Nesting support
15	P42	GC	Nesting support
16	P48	GC	Nesting support
17	P50	GC	Nesting support
18	P56	GC	Nesting support

Ordre	Pylon number	Breeding species	Pylons used by birds
19	P61	GC	Nesting support
20	P80	GC	Nesting support
21	P81	GC	Nesting support
22	P84	PB	Perchoir
23	P85	FL	Nesting support
24	P90	FL	Nesting support
25	P97	FL	Nesting support
26	P99	FL	Nesting support
27	P105	GC	Perchoir
28	P107	GC	Nesting support
29	P108	PB	Perchoir
30	P112	BF	Nesting support
31	P113	GC	Nesting support
32	P114	GC	Perchoir
33	P118	FL	Nesting support
34	P123	GC	Perchoir
35	P124	GC	Nesting support
36	P130	GC	Perchoir
37	P131	GC	Nesting support
38	P132	GC	Nesting support
39	P133	GC	Nesting support
40	P135	GC	Nesting support
41	P136	GC	Perchoir
42	P137	GC	Nesting support
43	P142	GC	Perchoir
44	P146	GC	Nesting support
45	P147	GC	Nesting support
46	P149	FL	Perchoir
47	P155	GC	Perchoir
48	P164	GC	Nesting support

(PB : Pigeon biset ; TB : Tourterelle des bois ; FL : Faucon lanier ; BF : Buse féroce ; GC : Grand corbeau).

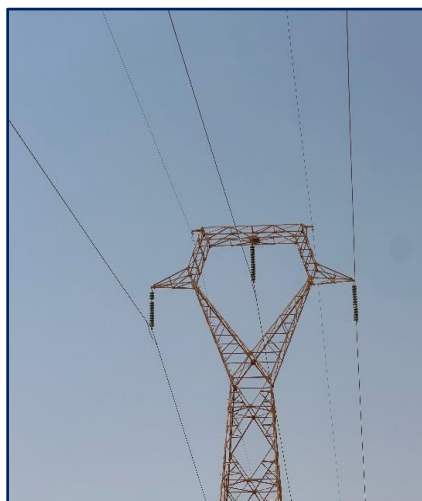


Figure 7.42 - Use of pylons as nesting sites

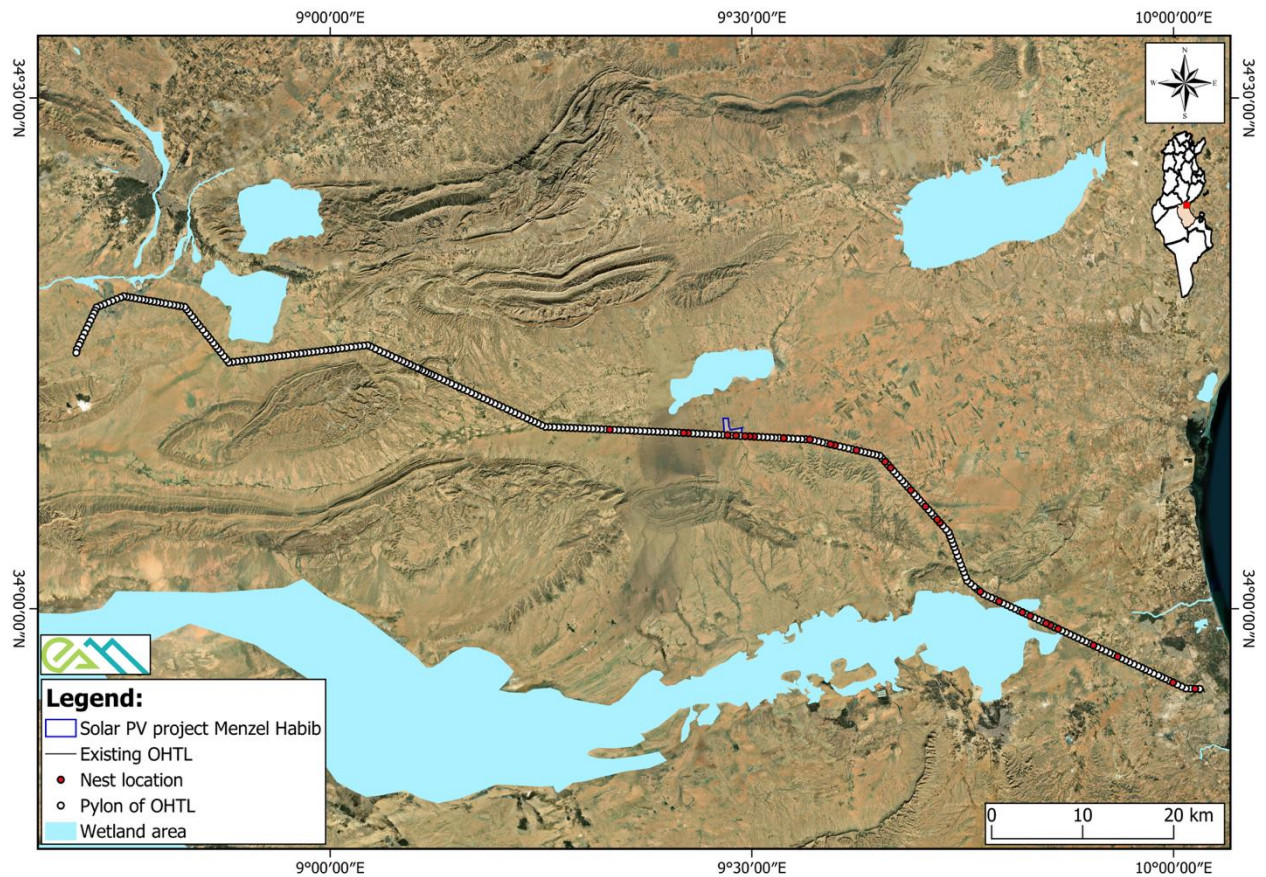


Figure 7.43 - Use of pylons as nesting sites

In addition, a systematic search for bird carcasses carried out along 62% of the TL. Only one case of mortality: pigeon (*Columba livia*) found more than 25 m from pylon no. 33. The absence of signs of predation suggests that the cause of death was related to electrocution or a parasitic disease.



Figure 7.44 - Case of mortality: pigeon

7.2.6 Protected areas

Within a 5 km radius along the existing 150 kV transmission line Bouhedma-Mdhilla (as per Figure 7.40 -), there are two (02) natural ecosystems of conservation interest. These are:

- Sebkhet Sidi Mansour or Garaet Sidi Manours– TN033 (approximately 4.3 km north of the

line), listed as a Ramsar wetland.

- Chott El Guetar (approximately 1.4 km north of the line), listed as a Ramsar wetland.
- Sebkhet El Hamma is a large endorheic saline depression, meaning it has no outlet to the sea. It is characterized by highly saline halomorphic soils and halophytic vegetation adapted to arid conditions. During the summer, the Sebkhet El Hamma is often completely dry.

It should be noted that Sebkhet El Hamma, located approximately 0.3 km away, is hydrologically connected to Chott El Fejej, which is itself connected to Chott El Jerid, a Ramsar site. However, despite this connection, Sebkhet El Hamma is not part of the Ramsar Convention and is therefore not officially recognised as a wetland of international importance.

-

Overview of Sebkhet Sidi Mansour or Garaet Sidi Mansour³

- Sebkhet Sidi Mansour or Garaet Sidi Mansour is a large basin in mainland Tunisia, ecologically comparable to Sebkhet Kelbia, but much further south and therefore more exposed to the climatic hazards of the pre-desert zone. Due to significant climatic variations and, above all, annual rainfall differences, this basin can remain dry for several consecutive years, which directly influences its hydrology and ecological role.
- Sebkhet Sidi Mansour or Garaet Sidi Mansour is an intermittent lake in a floodplain in the pre-Saharan steppe zone of southern Tunisia. The eastern part of the lake is freshwater and, during high water periods, is surrounded by a belt of tamarisk trees. The western part is saltier and surrounded by halophyte vegetation.
- The site, classified by BirdLife International as an Important Bird Area (IBA, site TN033), is notable for its importance to two key species: the marbled teal and the white-headed duck. However, there is no recent quantitative data to confirm a significant population.
- As for water birds, the almost permanent drying up of the Sebkha greatly reduces its attractiveness to water birds, except in exceptionally rainy years when a few hundred individuals may temporarily stay there.

Overview of Chott El Guetar⁴

- The site consists of a series of large, shallow depressions covering thousands of hectares that are irregularly flooded.
- The dominant vegetation on the site is halophytic, such as phragmites.

³ Descriptive sheet on Ramsar wetlands (FDR): Sebkhet Sidi Mansour

⁴ Descriptive sheet on Ramsar wetlands (FDR): Chott el Guetar

- Note: The Ramsar description of Chott El Guetar mentions the presence of remarkable fauna, such as the Oryx algazelle (*Oryx dammah*) and the Dorcas gazelle (*Gazella dorcas*), etc. However, these species are no longer present in the wild in Tunisia. Most of them now survive only in protected and fenced areas, such as Bouhedma National Park, which is home to populations of Dorcas gazelles and other species.
- It should be noted that the bibliographic data currently available on avifauna is outdated and obsolete and needs to be updated to reflect the current status of bird populations, particularly in light of recent developments related to climate change (decrease in rainfall and intensification of droughts).

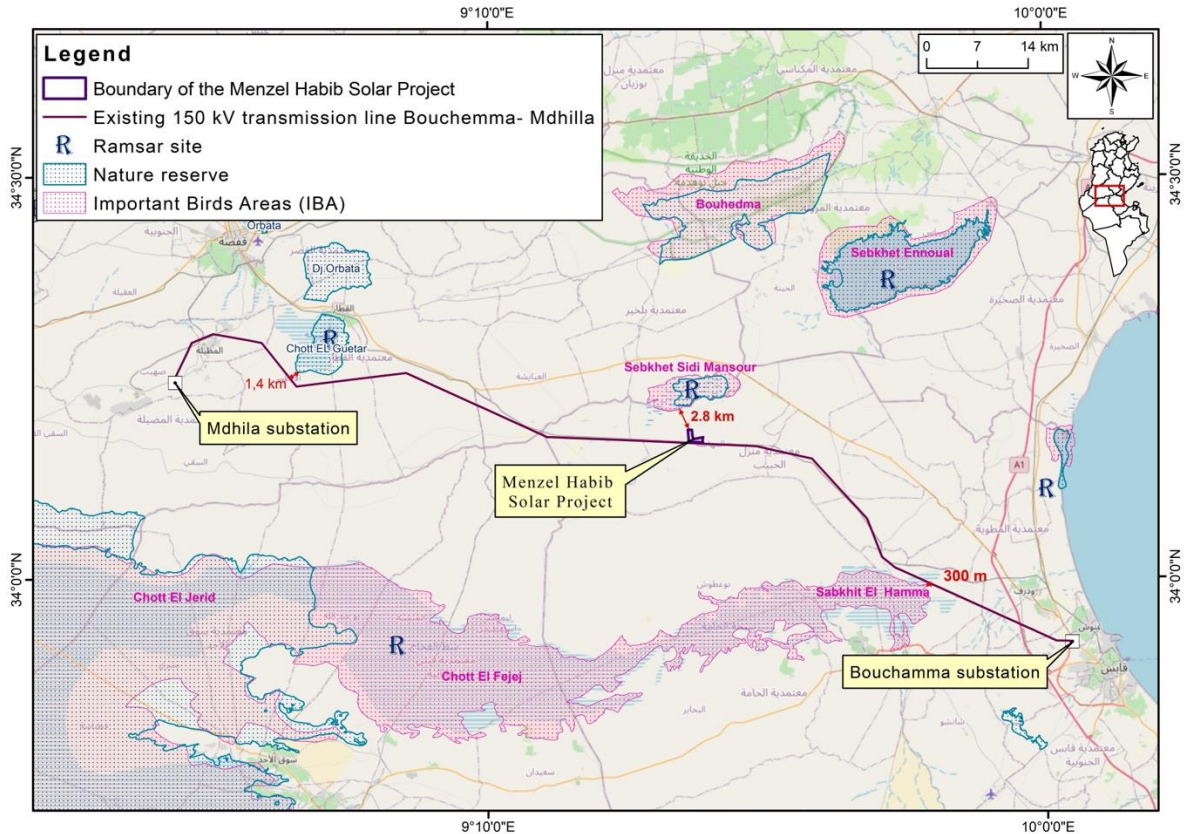


Figure 7.45 - Map showing the location of protected areas

7.3 Social Baseline conditions for the solar PV plant and new 225 TL

The socio-economic analysis focuses on the human environment and local economic dynamics, with an emphasis on land use, archaeology, cultural heritage, and social and economic aspects. The social analysis focuses on the project's area of influence, which is divided into two levels. The direct area of influence encompasses the El Mehemla village, located in the immediate vicinity of the Solar PV plant.

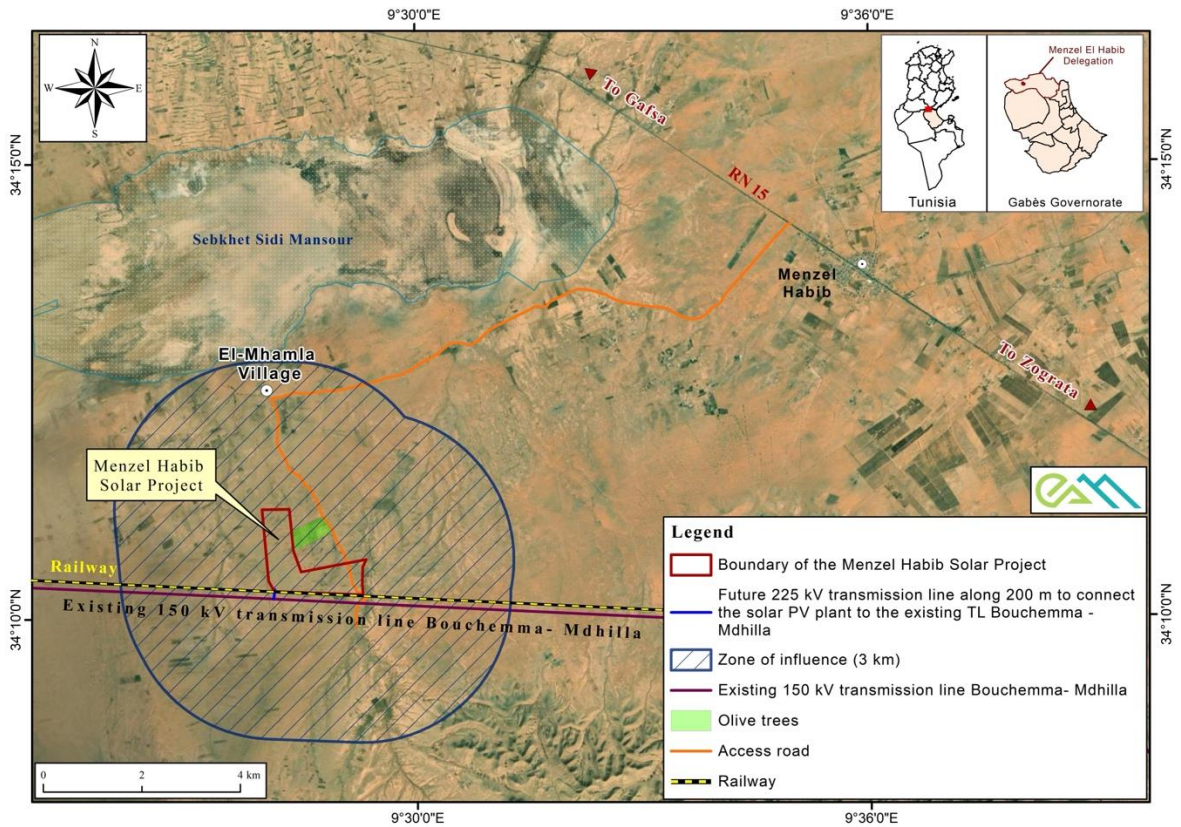


Figure 7.46 - Area of influence on social environment

The indirect area of influence corresponds to the entire Menzel Habib delegation and the governorate of Gabes. In addition, certain social data has been compared with the national average in order to better situate local specificities in their overall context.

7.3.1 Socio-economic status of the population

The PV solar plant site is located in the El Mehemla sector, which falls under the administrative jurisdiction of the Menzel Habib delegation in the Gabès governorate. This sector constitutes the project's direct area of influence, while the Menzel Habib delegation and the entire governorate represent the indirect area of influence. El Mehemla is an exclusively rural area with approximately 2,254 inhabitants in 406 households, with a slight majority of women. The population is declining, with a 3.47% drop between 2004 and 2014.

Migration is significant in the region, both nationally and internationally, mainly due to the lack of economic opportunities, infrastructure, and basic services. During public consultations held in August 2025, residents emphasized that the precarious nature of local life is driving many people to leave El Mehemla, particularly due to unemployment and the lack of health services, drinking water, transportation, and education.

Women particularly highlighted the precarious working conditions in agriculture and the risks associated with unregulated transportation of female agricultural workers. They recalled a tragic accident that occurred a few years ago, claiming the lives of seven female agricultural workers, which highlights the lack of safety and institutional support in this sector.

Economically, the Menzel Habib delegation is primarily agricultural, with nearly half of the working population employed in this sector. However, the site planned for the solar PV plant has no agricultural activity, although there are olive groves on the outskirts. The delegation has vast tracts of agricultural land and pasture, representing 15.6% and 15.7% of the governorate's land resources in these categories, respectively. However, its contribution to regional agricultural production remains marginal. Livestock farming, on the other hand, is more developed, with a significant share of the governorate's sheep and goat population. Industrial activity is very limited

in the delegation, with only two industrial units employing 38 people. The tourism sector is absent, despite the governorate's ecological and cultural assets.

The unemployment rate in the Menzel Habib delegation is 10.65%, with a significant disparity between men (6.17%) and women (21.55%). The overall activity rate is 45.36%, higher than the regional and national averages, although female participation remains low (24.14%). The poverty rate is very high in the Menzel Habib delegation, reaching 33.6%, which is double the national average and almost double that of the governorate.

In terms of education, the illiteracy rate reaches 29.82% in Menzel Habib, well above the regional and national averages. The school enrollment rate for children aged 6 to 14 is high, but access to higher education remains low (29.77% compared to 45.85% for the governorate as a whole). The sector has eight primary schools and two middle schools, but no high schools or universities. The proximity of a primary school in El Mehemla, located 2.3 km from the site, was discussed during consultations, as residents feared it would close due to low enrollment.

Access to healthcare is limited. The delegation does not have a hospital, but it does have ten basic health centers, one of which is located approximately 2 km from the solar PV plant site. However, according to the results of consultations carried out by the EAM consulting firm, this center is severely lacking in equipment and medical staff, which forces residents to travel to Ouedhreh for urgent care.

Basic services remain inadequate. The drinking water coverage rate is only 53.73%, well below the regional and national averages. In addition, the water from the SONEDE network is considered to be of poor quality by residents, who prefer to consume water from traditional wells. The electrification rate is 90.14%, which is still below regional and national averages. Connection to the sanitation network (ONAS) is virtually non-existent, with a coverage rate of only 5.47%, and residents mainly use septic tanks.

The road network consists mainly of agricultural tracks, with a connection to the RN15, the delegation's main road. However, this road is classified as high risk for accidents, according to International Road Assessment Programme (iRAP) maps. Finally, a railway line connecting Gabes to Gafsa passes close to the project site and is mainly used for transporting phosphate.

7.3.2 Protection of agricultural land

According to the agricultural land protection map, the solar PV plant is not located in a protected area, but it is located in area subject to authorization

Articles 6 and 8 of Law No. 83-87 of 11 November 1983 on the protection of agricultural land, Decree-Law No. 2022-68 of 19 October 2022, laying down special provisions for improving the efficiency of public and private projects, confirms that the implementation of renewable energy projects does not require a change in the use of agricultural land.

7.3.3 Access patterns

Access to the solar PV plant is illustrated in the figure below. The project area is crossed by several unclassified agricultural roads, some of which are used by residents to reach scattered dwellings in the vicinity. These roads are particularly important in rural areas such as Menzel Habib, where public infrastructure is limited and residents rely on them for daily travel, including access to fields, markets, or neighboring villages. Due to their unclassified status and rural context, no official data on vehicle numbers or traffic frequency are available; however, traffic is generally light and primarily related to local agricultural and residential activities.

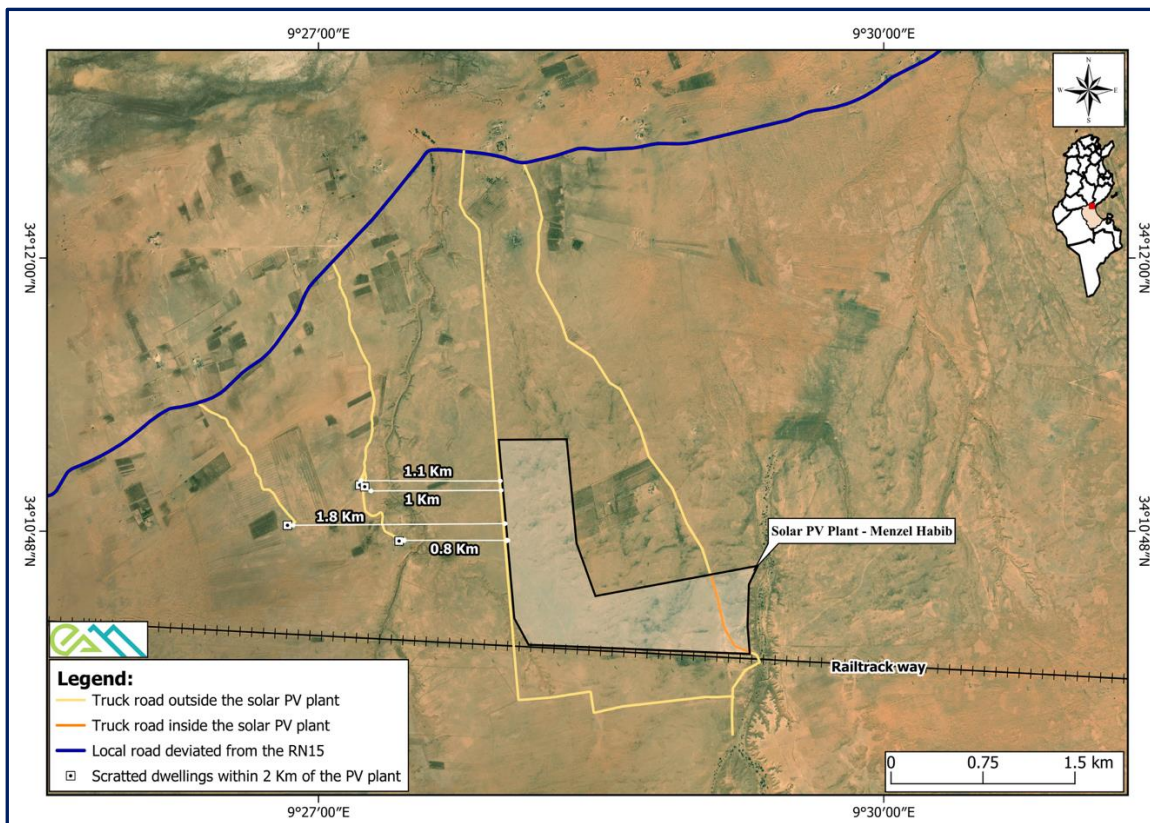


Figure 7.47 - Access truck road to the solar PV plant

7.3.4 Archaeology

The field survey (May 2023 and February 2025) did not reveal any archaeological structures on the solar PV plant. However, two important observations should be noted. Firstly, several flint fragments and a few pieces of ancient pottery, mostly insignificant and out of context, were observed on the surface at various points on the site (notably at waypoints: 34.169359 N / 9.487550 E; 34.171655 N / 9.488161 E; 34.172121 N / 9.486799 E; 34.173510 N / 9.486480 E; 34.174770 N / 9.485590 E; 34.174748 N / 9.484684 E; 34.185357 N / 9.477925 E; 34.184739 N / 9.471604 E). These artefacts, scattered and isolated, appear to have been carried by runoff water. One notable exception is the discovery of a Neolithic arrowhead of Capsian tradition, also outside an archaeological context.



Figure 7.48 - Flint flakes and Neolithic arrowhead, out of archaeological context, collected

during prospecting at the solar PV plant.

On the other hand, a cluster of heterogeneous objects was identified at point 34.171602 N / 9.487225 E, including flint fragments, ceramic sherds from different periods, porous stones and metal objects with no obvious archaeological value. Although this cluster could suggest a deposit site linked to popular practices, there is no concrete evidence to support this hypothesis. In summary, apart from these scattered and out-of-context finds, no significant traces of archaeological remains have been identified at the Solar PV plant.



Figure 7.49 - Cluster of heterogeneous objects spotted at waypoint 34.171602 N / 9.487225 E

In addition, it should be noted that there is an important archaeological site located outside the project boundaries, approximately 2.25 km north of the planned solar PV plant. This site is located precisely at the entrance to the north-south track that serves the project site. It consists of no fewer than two groups of ruins located on three perimeters diverging outward from the small village:

- **The first group of archaeological remains** consists of the ruins of an oil press. We identified these remains mainly thanks to the presence of a pressing table, a counterweight, several blocks of stone, and flattened walls. Some of these walls are crossed by the track leading to the proposed project site.

This group also includes a set of monolithic stones located to the right of the road from Menzel El Habib to El Aousej, across from the beginning of the track to the solar PV site. According to local oral tradition, these large stones were moved approximately 200 meters west of their original location following work carried out by the National Water Distribution Utility (SONEDE).

These cut stones likely belonged to an important ancient building constructed in opus quadratum.



Figure 7.50 - Various views of the archaeological remains at the site

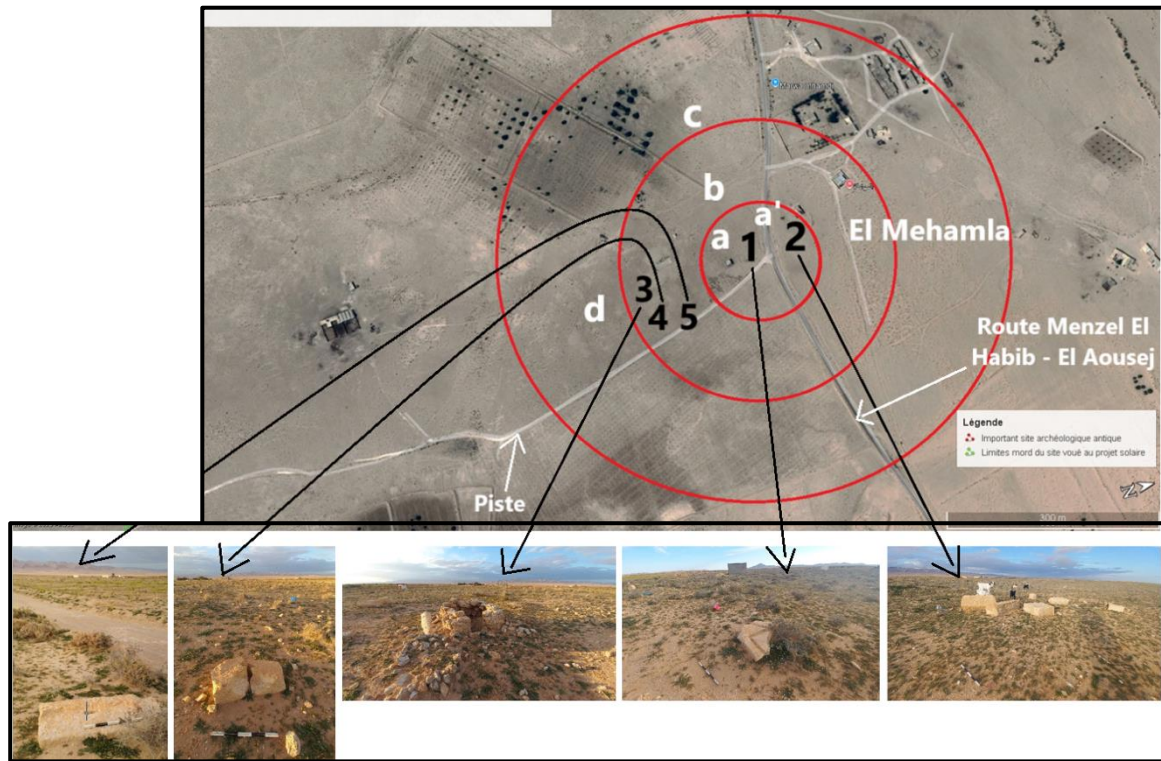
- The second group of archaeological remains** is located further south, about 600 meters north of the northern boundary of the proposed solar PV park site. This group consists mainly of a small archaeological mound that is occupied by a visitor center with a rustic appearance. The center is linked to local folk customs and contains a small M'zar, also known as a houta, which is associated with Lella Jouranyya.

Around the M'zar, which was built using dry stones collected from the archaeological site, there are a few architectural elements, notably two fragments of monolithic column shafts, as well as the remains of an ancient polychrome mosaic. Inside the mausoleum, at the foot of the low wall, are a few perfume burners and the base of an ancient amphora. In the immediate vicinity of the mausoleum are several pieces of pottery and a few fragments of ancient mosaics.

These two groups of archaeological remains finally reveal traces of ancient kilns, identifiable by the large number of failed firings.



Figure 7.51 - Location of the archaeological site, approximately 2.25 km north of the planned solar PV plant



Location and components of the ancient archaeological site of El Mehemla: 1. Elements of an oil press, 2. Group of monolithic stones moved from their original archaeological context, according to village oral tradition, some 200m to the west following work carried out by the National Water Distribution Utility (SONEDE), 3. Archaeological mound occupied by a small M'zar (a place visited by the local population) housing architectural decorations and the remains of a polychrome mosaic, 4. Sundial, 5. Door threshold formed by a large limestone slab, a-a'-b-c. Pottery kilns.

Figure 7.52 - Satellite view and photographs showing the main components of the El Mehemla archaeological site

The archaeological site of El Mehemla is therefore part of the environment of the Roman road of Asprenas and the entire Roman road network located in its immediate vicinity, and it houses unpublished scientific documentation; it must not be taken into account for the installation of any kind of work or transition areas that may be envisaged for handling operations and the movement of machinery, materials, and work tools.

Furthermore, in such a flood-prone environment, some archaeological remains may be covered by layers of deposits and sediments; This observation must be taken into account during the installation of the solar PV plant, particularly on its northern edge.

Conclusion

- The ground survey carried out at the solar PV plant did not reveal any archaeological sites, with the exception of a few flint fragments, pottery shards from various periods, porous stones and metal objects of no significant archaeological value.
- Outside the immediate boundaries of the solar PV plant site, approximately 2.25 km to the north, there is an archaeological site with clearly visible remains from the Roman period.

7.4 Social baseline conditions for the exiting 150 kV transmission line (140 km)

7.4.1 Global Overview of Demographic and Socio-Economic Characteristics

The existing transmission line crosses two governorates, Gabès and Gafsa. According to INS data (2024), Gafsa governorate has a population of 388,776, with density ranging from 4.18 inhabitants/km² in the least populated areas to 49.83 inhabitants/km² in the most densely populated zones. Gabès governorate has 410,847 inhabitants, with density varying between 49.83 and 81.40 inhabitants/km². The transmission line mainly crosses sparsely populated rural areas with scattered

settlements. Both governorates face significant socio-economic challenges, with unemployment rates of 26.27% in Gafsa and 19.06% in Gabès, well above the national average of 14.82%, while labor force participation remains below the national average of 46.55%, at 43.70% and 41.72% respectively. In Gafsa, most of the active population is employed in education, health, and administrative services (41.12%), followed by construction and public works (12.32%), and mining and energy (10.58%). In Gabès, administrative, educational, and health services dominate (26.57%), followed by construction and public works (20.23%) and manufacturing (18.29%). Access to basic services is slightly below the national average, with electricity coverage at 93.11% in Gafsa and 95.35% in Gabès, and drinking water at 80.58% and 88.75%, respectively. Connections to the sanitation network are limited, reaching 52.56% in Gafsa and 60.52% in Gabès, compared to the national average of 61.41%.

7.4.2 Land use along the TL

It is possible that the existing 150 kV transmission line along 140 km will cross a variety of land types with different land tenure statuses, including private property, collective land and plots belonging to the State or others. The planned interventions (in particular the replacement of insulators using aerial work platforms) will be carried out without any new land acquisition and using only existing access tracks, where available.

Analysis of land use along the high-voltage line shows that the land crossed is mainly open or uncultivated, with the exception of a few areas used for agriculture. It is estimated that:

- Approximately 6.2% (approximately 8.68 km) of the areas concerned are occupied by olive groves or other fruit trees;
- Approximately 5.8% (8.12 km) is used for market gardening, often on a small scale, for subsistence purposes.
- Seasonal grazing may occasionally take place under the transmission line route.

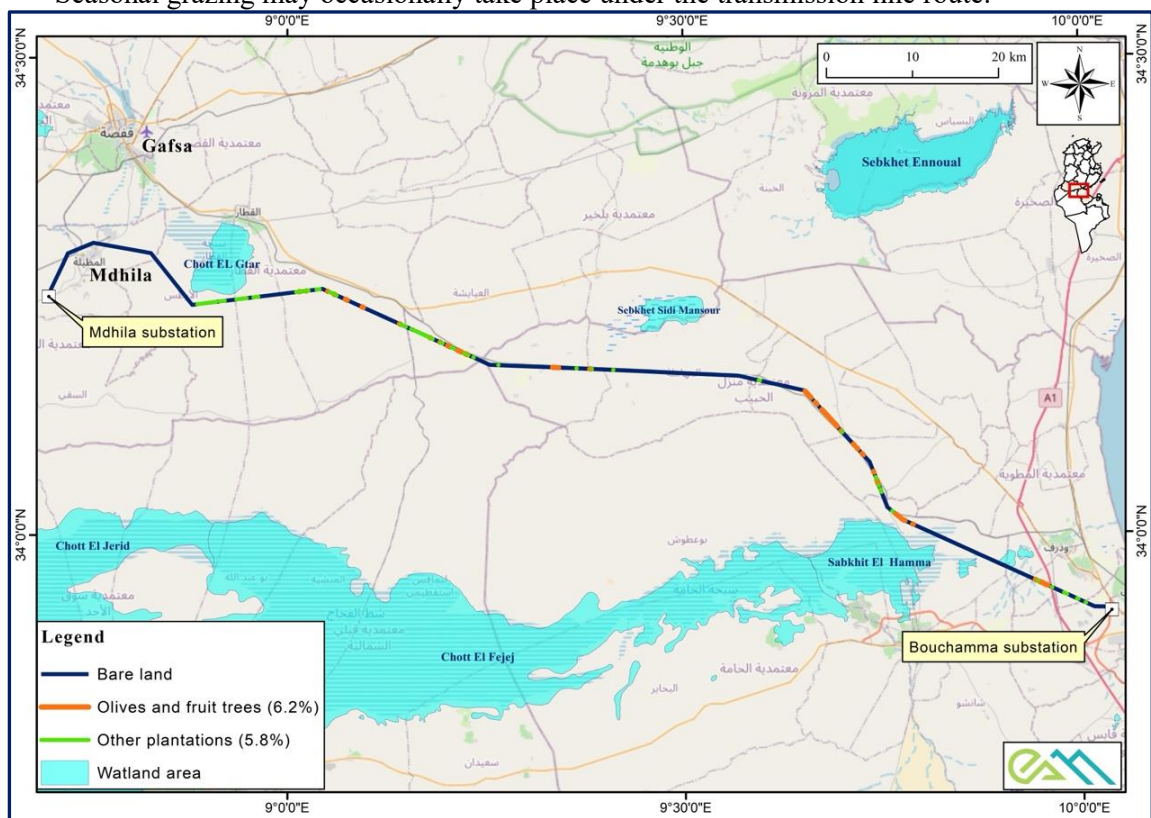


Figure 7.53 - Land use along the existing 150 k V transmission line Bouchamma - Mdhila

7.4.3 Identified structures along the TL

According to STEG's technical standards for the 225 kV high-voltage lines, the minimum distance

to be maintained from conductors located in the immediate vicinity is 14 m on each side.

As part of a proactive approach to identifying social issues, a spatial analysis using satellite imagery was conducted along the entire route of the line, four (04) are located less than 14 metres away (which corresponds to the minimum legal RoW established by STEG).




Figure 7.54 - Location of structures identified along the existing 150 kV transmission Bouchamma - Mdhilla (less than 14 m on either side of the line)

In addition, a field survey was carried out on 21–22 August 2025 to document the type and use of each structure.

The kilometre point (KP), the distance in (m) according to topographical survey, coordinates of and photos of each structure are detailed in the below table.

Table 7.11 -Census of structures located within 14 m of the 150 kV transmission line Bouchemma - Mdhilla

No.	KP	Distance (m)	Latitude	Longitude	Description	Photos taken on 21 and 22 August 2025
X1	33	12.8	34° 3'46.99"N	9°44'21.24"E	Mosque temporarily occupied	
X2	71.4	9.93	34°10'27.30"N	9°22'30.86"E	A permanently occupied house	
X3	73.6	Less than 1 m	34°10'30.30"N	9°21'3.16"E	Abandoned house	
X4	75.7	Less than 9 m	34°10'33.61"N	9°19'36.90"E	Mosque under construction	

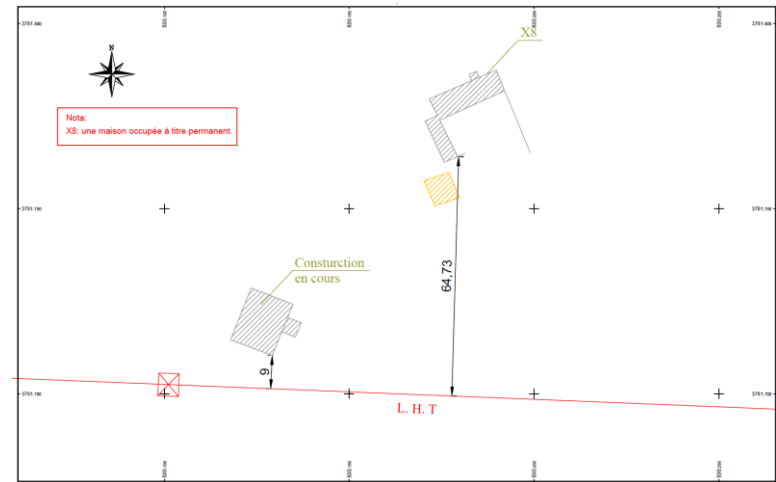
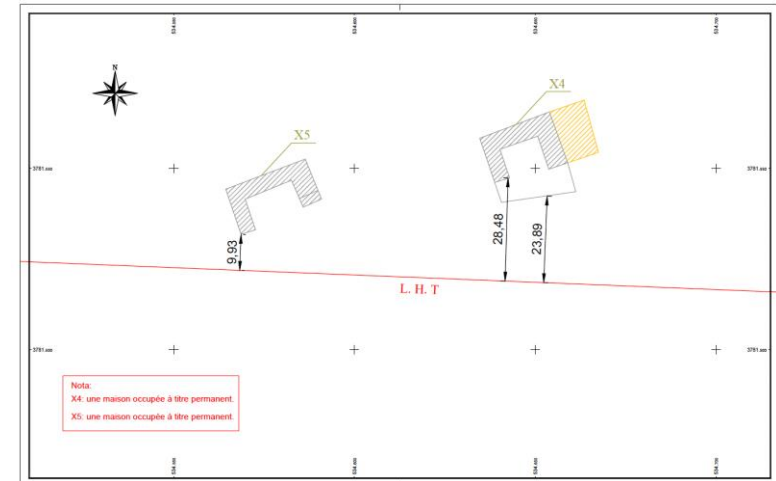
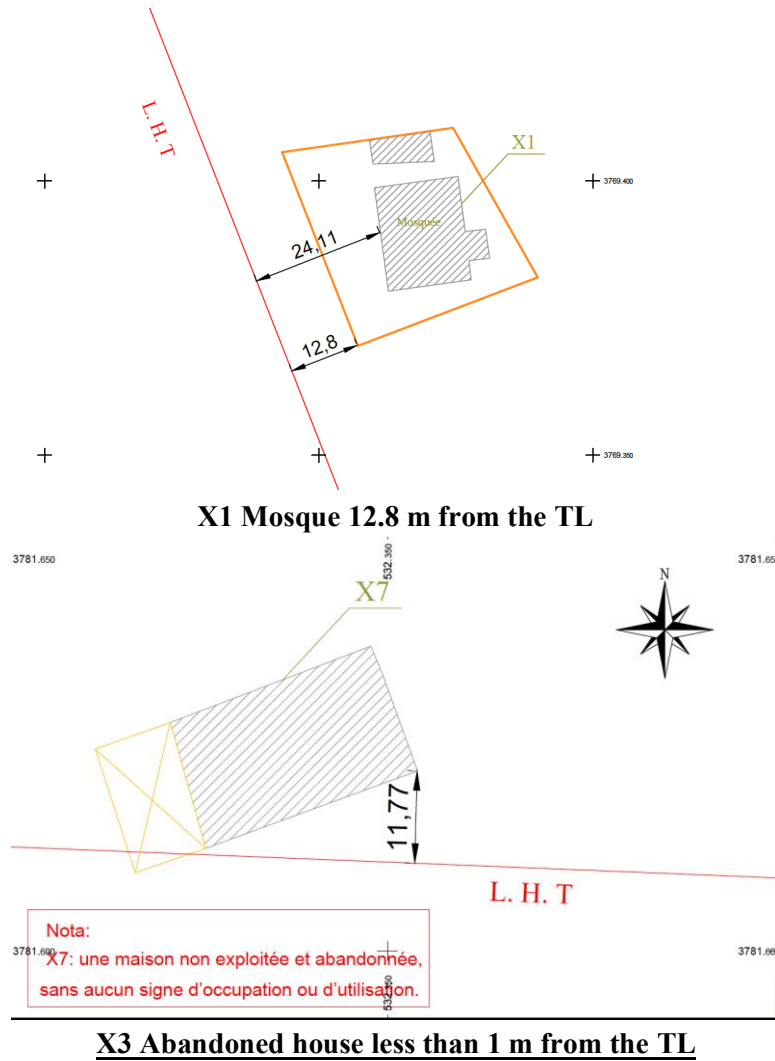


Figure 7.55 - Location of structures as per the topographical survey

7.5 Key findings of the solar PV plant

- Based on the climatic characteristics according to Emberger (1955), the site of the solar PV plant belongs to the lower arid bioclimatic zone with mild winters influenced by the Mediterranean climate.
- The average annual temperatures recorded in the study area over the last decade (2015-2024) are around 21°C.
- The monthly average GHI (global solar radiation) between 2015 and 2024 varies from 88.3 kWh/m² in December to 247 kWh/m² in July.
- The average monthly rainfall recorded in the project area over the last decade varies between a minimum of 0.1 mm in July and a maximum of 13.1 mm in March.
- Relative humidity in the study area varies between 38% and 63%.
- The average annual wind speed recorded over the last decade is 4.59 m/s.
- The area surrounding the Solar PV plant is mainly agricultural and has no significant sources of atmospheric emissions.
- The solar PV plant site is located away from major sources of noise, such as industrial activities, heavy road traffic or urban infrastructure.
- According to the map of natural regions of Tunisia, the solar PV plant is located in pre-Saharan Tunisia, in the southern low plains natural region.
- The terrain at the site is generally flat, with an altitude ranging from 95 to 111 meters and a very gentle slope of no more than 0.8°, with no major topographical variations or fault structures. However, at the southern end of the site, sedimentary deposits have led to some micro-relief features.
- It is important to note that the Menzel Habib region is subject to wind erosion, while a single process of water erosion is found throughout the solar PV plant, with incision dynamics and moderate severity.
- The solar PV plant is mainly located in a plain of Quaternary origin.
- Two types of soil have been identified at the solar PV plant: poorly developed soils and iso-humic soils.
- According to the hydraulic study (carried out in February 2024), the solar PV plant site is marked by El Herriga wadi (the eastern boundary of the project) and El Oussif wadis (western boundary of the project), and a diffuse watercourses flow in a north-easterly and north-westerly direction, following the existing earth embankments downstream of the railway line
- In hydrogeological terms, the groundwater resources of the study area are composed of both the shallow and deep aquifers of Menzel Habib..
- Based on Tunisia's seismotectonic map, the study area is characterised by low-frequency seismic activity due to its location in a seismic intensity zone between II and IV on the Medvedev-Sponheuer-Karnik (MSK) scale.
- The site is located in an that is not significantly affected by lightning strikes with an average of four (4) atmospheric discharges per km²/year.
- The solar PV plant does not present a fire risk due to the limited and sparse vegetation.
- The entire southern region of Tunisia is subject to sandstorms, particularly Menzel Habib.
- The results of the flood risk study indicate that flooding of the El Herrigua wadi to the east of the site has been identified. However, the El Oussif wadi catchment area generally generates few significant overflows. In addition, a flood zone has also been detected, originating from watersheds BV-2 and BV-3.
- In terms of landscape characteristics, the site has no notable views, offering a barren landscape that reflects the harsh climatic conditions of the environment. The only views visible from the site include the railway line, the high-voltage power line, and the Jebel Zemlet el Beidha mountain range to the south of the Solar PV plant.

- In terms of flora, a detailed mapping of the vegetation cover at the solar PV plant site, conducted using remote sensing techniques, revealed a predominantly sparse vegetation pattern. The analysis indicates that 59.9% of the area consists of bare soil, while 35.7% supports low vegetation cover. Areas with medium vegetation density account for 3.7% of the site, and only 0.7% is covered by dense vegetation.
- The biodiversity of the El Mehemla - Menzel Habib steppe is generally moderately rich in plant and animal species due to the spatial homogeneity of the area and the lack of habitat diversity.
- The vegetation in the area is characteristic of arid and steppe zones, while most animal species are ubiquitous and widely distributed in Tunisia.
- No taxa are considered rare, vulnerable or threatened. Only one mantid, *Eremiaphila denticollis*, represented by the subspecies *E. d. tunetana*, is endemic.
- With regard to avifauna, ornithological surveys conducted on 14 February 2025 at the solar PV plant recorded a total of 12 bird species belonging to eight different families. Among these, three species were classified as rare, three as frequent, and six as common species.
- No raptors or water birds were observed on the site, indicating that there are no major ornithological issues. However, one species classified as "Vulnerable" (VU) on the IUCN Red List and on the national list was identified: the southern shrike, which is widespread and common in central and southern Tunisia.
- The solar PV plant is not located on a recognised bird migration corridor and is approximately 3.2 km from Sebkhet Sidi Mansour. A study of the general geographical context shows that it is impossible for waterbirds to migrate between the project site and this wetland of conservation interest.
- According to the agricultural land protection map, the site of the proposed solar PV plant is not located in a protected area, but it is located in an area subject to authorization articles 6 and 8 of Law No. 83-87 of 11 November 1983 on the protection of agricultural land. However, Decree-Law No. 2022-68 of 19 October 2022, laying down special provisions for improving the efficiency of public and private projects, confirms that the implementation of renewable energy projects does not require a change in the use of agricultural land.
- With regard to demographic data, according to the latest general population census (INS, 2014), the Menzel Habib delegation had 10 148 inhabitants grouped into 2 019 households and 2 620 dwellings, of which 2 254 inhabitants belong to the El Mehemla sector, grouped into 406 households and 501 dwellings. It is important to mention that the population of the El Mehemla sector and the Menzel Habib delegation is entirely non-communal.
- In terms of migration, the Menzel Habib delegation has a negative net migration rate of -747 for inter-delegation migration and -38 for international migration.
- In Menzel Habib, overall unemployment is low (10.65%), but women are more affected (21.55%) than men (6.17%). The activity rate is 45.36%, higher than the national average, but much higher for men (71.03%) than for women (24.14%). Poverty is also high at 33.6%, above regional and national levels.
- The illiteracy rate in the Menzel Habib delegation is 29.82%, which is significantly higher than that of the Gabes governorate (17.70%) and the national average (19.27%).
- The nearest school to the solar PV plant is a primary school in El Mehemla, located 2.3 km from the site.
- The Menzel Habib delegation has no hospital infrastructure, but has ten basic health centers, one of which is located approximately 2 km north of the solar PV plant, without any hospital beds.
- The Menzel Habib delegation has a drinking water supply rate of 53.73%, well below the averages for the governorate of Gabes (88.75%) and the national average (84.6%). The

connection rate to the ONAS sewage network is 5.47%, also below the averages for the governorate of Gabes (60.52%) and Tunisia (61.41%). As for electricity, coverage reaches 90.14%, remaining below the average for the governorate of Gabes (95.35%) and Tunisia (96.4%).

- With regard to waste management infrastructure, in Tunisia, the collection, transport, treatment and disposal of hazardous and special waste is strictly regulated. The list of companies authorised by the Ministry of the Environment to manage this waste can be consulted on the website of the National Waste Management Agency (ANGed).
- With regard to non-hazardous waste, the Gabes Governorate has a controlled landfill site, built by ANGed in 2007, for the treatment of household waste. This landfill site is located in Jbel Eddissa, approximately 50 km from the solar PV plant site.
- In terms of road and rail infrastructure, the main traffic route for the Menzel Habib delegation, the RN15 national road, has an estimated traffic volume of around 2,803 vehicles per day. According to the International Road Assessment Programme (iRAP), in collaboration with the University of Sfax, this road is classified as a high-risk road for car accidents, based on data collected between 2015 and 2019. In addition, the governorate of Gabes has a 128 km railway network, and the southern part of the solar PV plant site is crossed by the railway line linking Gabes to Gafsa for the transport of phosphate.
- The undeveloped land is currently used for herding activities by the landowner for his own livestock. The activities are carried out by his employees.
- Regarding the archaeological survey conducted on the solar PV plant, no archaeological sites were identified. However, outside the immediate boundaries of the solar PV plant, approximately 2.25 km north of the site, a site with clearly visible Roman-era remains has been recorded.

8.0 IMPACT ASSESSMENT AND MITIGATION MEASURES

This chapter identifies and assesses the potential impacts associated with the project, including the resources and receptors of the physical, biological and social environments. It is structured according to the different phases of the project life cycle defined above in order to understand the risks and impacts associated with each phase.

The impact assessment is presented separately for the construction, operation and decommissioning phases.

8.1 *Impacts that expected to occur for the solar PV plant and the new 225 kV TL (200 m)*

8.1.1 *Impact during construction phase*

The construction activities for the solar PV plant will include the transportation of equipment and project components to the site, as well as preparatory works such as the installation of photovoltaic panels, transmission cables, inverters, transformers, access roads, the internal road network, ancillary buildings, fencing, and more. These works will require vegetation clearance, land leveling, and soil excavation. Regarding the connection of the solar plant, 3 pylons will be installed and the works will be carried out entirely within a site secured by the Developer.

The impacts for the construction phase are assessed using the following topic areas:

(i) Impacts on physical environment

- **Landscape and visual setting**

C.1. The physical presence of the solar PV plant, pylons, and TL conductors once installed will alter the landscape and generate visual impacts.

- **Resource efficiency and pollution prevention and control**

C.2. The presence and operation of heavy machinery inside the PV site, at pylon locations, and along temporary access roads, leading to changes in the geology and geomorphology of the area, causing soil disturbance, degradation, and an increased risk of landslides

C.3. The use of machinery and temporary access roads leading to soil compaction, potential changes to water drainage flows, and local contamination from leaks and spills

C.4. The generation of air and noise emissions from construction machinery leading to the generation of a nuisance and air pollution.

C.5. The generation of hazardous and non-hazardous waste leading to soil and groundwater pollution.

C.6. The use of water for construction of the solar PV plant and TL and the workforce leading to a reduction in the availability of this resource to other users.

(ii) Impacts on biological environment

- **Biodiversity conservation and sustainable management of living natural resources**

C.7. Potential impacts on habitats and species of flora

C.8. Potential impacts on fauna (except birds)

C.9. Potential impacts on avifauna.

(iii) Impacts on social environment

- **Labor and working conditions**

C.10. The provision of poor-quality working conditions provided to the contracted workforce leading to a reduction of wellbeing and risk of regulatory enforcement due to violations of national labour legislation.

C.11. The presence of child and forced labour at the workplaces of supply chain companies.

- **Economy and employment**

C.12. The capital spends by the EPC Contractor on businesses supplying materials and

services, leading to an increase in revenue to the owners of the businesses used and potentially an increase in their workforce.

C.13. The use of an installation workforce from the generation or continuation of employment, and the provision of training opportunities, leading to a sustained or increase in household income.

C.14. The generation of a limited number of local employment opportunities, leading to intra- and inter- community tensions arising from high expectations of the number of local employment opportunities.

- **Health, safety and security**

C.15. The road transport of materials and personnel using the public road network, use of construction machinery, and the presence of excavations, leading to health impacts to pedestrians and other road users, and local people.

C.16. The occupational health and safety risks to the workforce leading to injuries or fatalities.

C.17. The use of security personnel to guard equipment and other areas leading to a reduction in the wellbeing of local residents due to their inappropriate behaviour.

- **Land access**

C.18. The restriction to access land inside the solar PV plant from installation of the perimeter fence.

- **Cultural Heritage**

C.19. The installation solar PV plant and TL, and use of temporary access roads, leading to disturbance and damage of subsurface archaeological remains where present.

8.1.1.1 Impacts on physical environment

C.1. The physical presence of the solar PV plant and the new 225 kV TL (200 m) components will alter the landscape and have visual impacts.

The solar PV plant site and the new 225 kV TL (200 m) is a sparsely vegetated steppe located in the pre-desert region of the southern low plains of Tunisia and covering approximately 200 hectares. Site preparation work will include the installation of networks, transmission cables, access roads, the internal road network, as well as storage buildings and other technical infrastructure. These activities will involve clearing existing vegetation, levelling the ground and excavation operations, resulting in a significant change to the natural appearance of the site. From the early stages of construction, the introduction of machinery, equipment and temporary structures will create a visual break with the landscape. However, it should be noted that the site is relatively isolated and located approximately 4 km from the RN15 national road via an access road and 2.3 km from the village of El Mehemla, from where the construction site will be barely visible.

Both the PV plant site and the transmission corridor of 200 m are situated away from tourist infrastructure, major roads, or designated viewpoints, and visual receptors in the area are extremely limited. As such, although construction activities will temporarily alter the visual character of the landscape, particularly through the movement of vehicles, temporary structures, and localized dust emissions, these effects will be direct, localized, short-term, and fully reversible upon completion of construction. Given the low visual sensitivity of the surrounding environment and the absence of tourism or high-value landscape features, the overall significance of visual and landscape impacts during the construction phase is considered minor.

Project Stage	Construction		Operation		
	Landscape impacts will begin during site construction and will persist through the operational phase due to the presence of PV modules, fencing, internal roads and pylons				
Impact Nature	Positive		Negative		
	The presence of machinery, exposed soils, and construction works will alter the visual character of the area.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is direct during the construction phase due to the visible changes that will occur. The impact is irreversible as Project infrastructure and pylons will remain in place until they are decommissioned.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	As the solar PV plant will remain in place for at least 25 years, the impact is considered permanent.				
Impact Extent	Local	Regional	National	International	
	The visual impact is restricted to the Project footprint and its immediate surroundings. It will not cover the entire delegation and so is not a regional impact. The land is flat in the delegation generally, so the infrastructure will not also be seen from a significant distance away from viewpoints.				
Impact Magnitude	Negligible	Low	Medium	High	
	The solar PV plant is situated in an isolated, sparsely populated area. The overall visual contrast is limited. The TL traverses a landscape of low visual sensitivity. Impact is low because the infrastructure is confined to a small area entirely inside the El Mehemla sector, which belongs to the Menzel Habib delegation. There are no tourist facilities in the area, and the land has no significant aesthetic value. TL pylons (number of 3) do not stand out in the landscape, as the thin, black conductors blend in with the environment and do not reflect sunlight.				
Receptor Sensitivity	Negligible	Low	Medium	High	
	Receptor sensitivity is low as there are no important landscape features, or visual viewpoints, enjoyed by national or international tourists in the vicinity of the PV solar plant site and TL route				
Gender and vulnerability Considerations	Yes		No		
	There are no gender and vulnerability considerations for this impact.				
Data gaps and further studies required	None required.				
Impact Significance	Negligible	Minor	Moderate	Major	
	The potential impact significance is minor.				
Opportunities	None.				

The following measures will be implemented by the EPC contractor:

- The construction will be kept orderly at the end of each working day:
 - Areas within the solar PV plant site and the transmission corridor will be designated and used during construction for the storage of materials, supplies and equipment necessary for the Project's construction.
 - Construction waste (mainly soil, rocks, debris, etc.) and general municipal waste generated by workers (such as food, paper, glass, bottles, plastic, etc.) will be collected and transported to the nearest controlled and approved landfill site. Hazardous waste (used oils, lubricants, paint cans, solvents, etc.) will be managed by companies authorized by the Ministry of Environment (ME).
 - All areas will be fully restored once they have been used for construction work in order to restore the natural visual environment as far as possible.
 - Parking areas for vehicles will be planned on the construction site and at the base camp.
- Areas of land disturbed during construction will be inspected before the contractor's demobilisation to verify that the land has been properly restored (after the contractor's mobilisation, it may be difficult to restore the land, depending on the availability of machinery).
- All artificial lighting will adopt a downward lighting strategy to limit emissions outside the project site.

C.2. The presence and operation of heavy machinery inside the solar PV site, at pylon locations, and along temporary access roads, leading to changes in the geology and geomorphology of the area, causing soil disturbance and degradation.

The solar PV plant and the transmission corridor, covering an area of approximately 200 hectares with low agricultural potential, features generally flat, with an altitude ranging from 95 to 111 meters and a very gentle slope of no more than 0.8°. Localised micro-relief appears in the southern part (not exceeding 1 meter), linked to sedimentary deposits resulting from water erosion. Construction work, in particular the opening of tracks and the use of heavy machinery, may cause soil degradation through compaction, trench formation or alteration of surface water flows. However, the overall flat topography limits the extent of earthworks required. It should be noted that the developer has carried out a geotechnical study on the site. The lithology consists of fine beige dune sand, identified between the surface and a depth of 0.50 m, and calcareous clay-silty sands with a beige to brick-red color and traces of gypsum, identified between 0.00 m and -6.00 m depth. The mechanical properties are high and recommendations concerning the foundations have been made (mainly shallow isolated footings for buildings and driven steel piles for structures).

There are also potential soil contamination risks in case of fuel leaks or spills. Waste (solid, liquid and wastewater) will be generated by the operation of the workers’ camp. It is important to note that, from a climatic point of view, the entire Menzel Habib region is subject to sandstorms. Construction activities must be carefully managed to prevent localized degradation, particularly through wind erosion. All temporarily used areas will be restored upon completion of construction, as per the project’s Pollution Prevention Management Plan. Restoration measures will include surface reconditioning, light grading, and stabilization to facilitate future land use continuity.

Project Stage	Construction		Operation		
	Impacts will occur due to grading, excavation, and machinery movement across the solar PV site and associated TL alignment.				
Impact Nature	Positive		Negative		
	Soil disturbance, compaction, and erosion are potential negative effects of construction activities.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	Impacts are directly caused by earthworks and can generally be reversed through proper post-construction restoration. However, if restoration measures are not implemented effectively, localized compaction, erosion, or soil degradation may become long-term or irreversible.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact duration is temporary as the disturbance is confined to the duration of construction				
Impact Extent	Local	Regional	National	International	
	The impact is restricted to the solar PV plant footprint and TL alignment within the Menzel Habib delegation.				
Impact Magnitude	Negligible	Low	Medium	High	
	The impact magnitude is low, terrain is flat, and disturbance is spatially limited. However repeated use of machinery and wind exposure could cause moderate localized degradation if unmanaged.				
Receptor Sensitivity	Negligible	Low	Medium	High	
	Receptor sensitivity is low as the pylons will be placed at areas which deliberately avoid being close to a structure or house, for several reasons (not just the generation of air and noise). The risk of impacting a dwelling from these sources of emissions is very low.				
Gender and vulnerability Considerations	Yes		No		
	There are no gender and vulnerability considerations for this impact.				
Data gaps and further studies required	None.				
Impact Significance	Negligible	Minor	Moderate	Major	
	The significance of this impact is rated as minor.				
Opportunities	None.				

Mitigation measures

The following mitigation measures will be implemented:

- Consideration of the results of the geotechnical study, particularly the use of shallow isolated footings for buildings and driven steel piles for structures
- Optimization of site layout to minimize direct wind exposure.
- Elevation of solar panels to prevent sand accumulation and facilitate cleaning.
- The camp and construction site will be located more than 100 meters from the nearest watercourse, in particular from hydraulic structures located under the bridge, in order to prevent any risk of direct runoff to the camp in the event of heavy rain.
- Avoid carrying out excavation works under severe weather conditions.
- Soil segregation during trench excavation in cases where multiple soil horizons are present. Excavated materials will be temporarily stored in separate categories corresponding to the different subsoil layers. During backfilling, the sorted materials will be reused to restore the subsoil to its original condition. A designated area will be set up to receive the different categories of excavated (and imported) materials, with clear signage for waiting areas, whether for soil or other materials. Trucks transporting excavated materials and aggregates will be securely covered with tarpaulins.
- Clear markers will be placed to indicate the storage area for excavated materials in order to restrict the movement of equipment and personnel, thereby limiting physical disturbance of the land and soil in adjacent areas.
- Restore disturbed surfaces during construction to their original condition (or better) as far as possible.
- A specific area shall be set aside for refuelling, with an impermeable surface to prevent any seepage into the ground. Removable tarpaulins shall be installed to contain and immediately recover any accidental spills before they can spread into the environment. In addition, spill response kits, including absorbent rolls and containment systems, shall be strategically located on site, particularly in this area. Measures will also be put in place to protect this area from rainwater. (For example, the installation of a temporary canopy, "a temporary canopy can be a sheet metal or tarpaulin roof stretched over a metal frame to prevent rainwater from washing away or carrying pollutants into the environment.")
- Outside of working hours, no toxic or polluting products will be left on the site outside the area designated for this purpose, thus avoiding any risk of dispersion during the night, whether criminal (vandalism) or accidental (gusts of wind, heavy rainfall, etc.).
- The machinery used will be regularly maintained to reduce the risk of accidental pollution.
- A Stormwater and Erosion Control Management Plan will be developed for both construction and operation phases to manage runoff and protect soils. The prior hydrological study has already proposed additional technical solutions that can be applied effectively

C.3. The use of machinery and temporary access roads leading to soil compaction, potential changes to water drainage flows, and local contamination from leaks and spills

The use of heavy machinery, generators, and mobile equipment entails the risk of localized soil contamination due to accidental leaks or spills of fuels, lubricants, and other hazardous liquids. A diesel tank will be installed onsite for refuelling purposes, and additional fuel and oil may be transported along the TL corridor to support equipment operating at pylon locations. While the quantities of hazardous substances stored or used will be relatively small, improper handling or equipment failure may result in surface or shallow subsurface contamination. However, such contamination is expected to be highly localized, confined to construction zones, machinery parking areas, or temporary refuelling sites. The soils in the area are characterized by low permeability; appropriate mitigation measures will be implemented as part of the Pollution Prevention Management Plan. These include the use of bunded fuel tanks, designated refuelling

areas, and supervision by trained personnel. As a result, the probability of significant spills is considered low, and any minor incidents can be promptly remediated. The reversibility of impacts depends on the nature and severity of contamination. With effective containment and cleanup protocols, most soil pollution events will be reversible. However, in the event of mismanagement or larger spills, long-term impacts may occur.

For flooding risk, the design solar PV plant, in particular the layout of the photovoltaic panels, was carried out considering the results of the hydrological study. The hydrographic network was taken into consideration to avoid any installation in areas at risk of flooding. In addition, the layout of the southern part of the site has been adjusted, positional shift from the initial plan location, in order to exclude the area under the railway bridge, which has been identified as sensitive in the event of flooding. However, additional technical solutions will need to be implemented in accordance with the recommendations of the hydrological study.

Project Stage	Construction		Operation		
	The impact will occur during the construction stage				
Impact Nature	Positive		Negative		
	The impact is negative due to potential changes to local drainage flows and soil compaction and quality.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	Direct impacts could occur to surface water and groundwater. The impact is, reversible or irreversible, depending on the nature and severity of the disturbance/contamination and the restoration/remediation measures implemented.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	Temporary changes in surface water quality (from increased turbidity and other quality changes from leaks and spills) and the quality of groundwater could occur. It is unlikely that a major spill will occur given the expected quantities of liquid hazardous chemicals that are to be stored.				
Impact Extent	Local	Regional	National	International	
	Pollution would be highly localized at machinery operation zones, refuelling points, or storage areas.				
Impact Magnitude	Negligible	Low	Medium	High	
	If a leak does occur, the impacted area is likely to be a small quantity as large volumes are not being stored onsite.				
	In addition, impact to surface water is considered low as the design solar PV plant, was carried out considering the results of the hydrological study. The hydrographic network was taken into consideration to avoid any installation in areas at risk of flooding.				
Receptor Sensitivity	Negligible	Low	Medium	High	
	The sensitivity of surface water and groundwater resources is medium as Tunisia is a water scarce country and main livelihoods are agriculture based. Near the solar PV plant, many livelihoods are agricultural.				
Gender and vulnerability Considerations	Yes		No		
	There are no gender and vulnerability considerations for this impact.				
Data gaps and further studies required	Pollution risks are well-understood and will be managed through established protocols under the Pollution Prevention Management Plan. Hydrological study already prepared by the developer				
Impact Significance	Negligible	Minor	Moderate	Major	
	Minor as construction activities will be limited to specific locations where works are ongoing and will be highly localised.				
Opportunities	None.				

The following management plans will be developed by the EPC contractor:

- Pollution Prevention Management Plan (The prevention of soil, groundwater and surface water contamination)
 - All hazardous materials (diesel, oils stored at vehicles workshops) shall be located within a secure, bunded area. The secondary containment must be able to hold 110 % per cent of the container's capacity, or where there is more than one container within the secondary

- containment, 110 % of the largest container or 25 % of the total, whichever is greater.
- A dedicated refuelling area shall be available at each construction site which is within an impermeable area so that any leaks and spills can be easily cleaned up. A refuelling procedure shall be used which includes checking the volume of fuel that is required and the capacity in the tank, temporary containment in the form of drip trays, communications between personnel, and a post-fuelling check to ensure any leaks are cleaned up immediately.
 - Spill kits shall be available across the site in accordance with the Emergency Response Plan to deal with minor leaks and spills.
 - No wastewater shall be discharged into a river unless it has been subjected to a site-specific assessment and water quality testing (as above).
 - No vehicle washing shall be undertaken.
 - All areas of land temporarily used during the construction stage shall be restored back to their original condition. No waste or other material shall be left and the site shall be inspected by the Developer before the contractor's scope is considered to be completed and the final invoice paid

C.4. The generation of air and noise emissions from construction machinery leading to the generation of a nuisance and air pollution.

Construction activities for the PV solar plant and TL will involve the use of heavy machinery, generators, and vehicles for earthworks, excavation, equipment transport, and pylon installation. These activities will lead to the generation of air emissions primarily dust and diesel exhaust and elevated noise levels. Dust may be generated during dry and windy periods, particularly during site clearance and grading. Diesel engines will emit nitrogen oxides (NO_x), particulate matter (PM), and greenhouse gases (GHG), although in relatively small quantities. Noise from construction equipment and transport vehicles may cause temporary nuisance, especially near the solar PV site and pylon locations or along access roads. Given the climatic characteristics, particularly the occurrence of sandstorms, dust generation will be higher.

Given the sparse population and absence of sensitive receptors (the nearest El Mehemla, is located 2.3 km away), impacts are not expected to be significant. Nonetheless, adjacent land users and pastoralists may be exposed to short-term nuisance. These groups will be informed in advance of the construction timeline and expected disturbances. The project's community grievance mechanism will also be available for reporting any related concerns. All emissions are expected to cease upon completion of the construction phase. Air and noise emissions will be managed under the Pollution Prevention Management Plan, which includes measures for dust suppression, equipment maintenance, and scheduling of works during daylight hours.

To estimate the Sound Pressure Level (SPL) produced during the construction phase, it has been assumed that the sound wave propagates through a homogeneous atmosphere without loss due to attenuation. The SPL is defined by the following equation:

$$SPL1 = SPL2 - 20 * \log_{10} (r1 / r2)$$

The sound pressure level at a distance r1 (SPL1) is equal to the sound pressure level at a distance r2 (SPL2), minus twenty times the decimal logarithm of the quotient between the distance r1 and the distance r2.

EQUIPMENT	NPS	NPS at 1 m
Truck	90 dB(A) at 1 m	90 dB(A)
Excavator	95 dB(A) at 2 m	101 dB(A)
Concrete mixer	85 dB(A) at 5m	99 dB(A)
Crane	75 dB(A) at 6 m	91 dB(A)
Compressor	80 dB(A) at 5 m	94 dB(A)
Welding equipment	80 dB(A) at 3 m with possible peaks of 85 dB(A)	90 dB(A) with possible peaks of 95 dB(A)

When using the noisiest machine during daytime, the sound pressure level will be: NPS = 101 dB(A) at a distance of 1 meter.

According to the formula indicated, the NPS at a distance of 200 meters from the works will be 55dB. This value is a maximum value that is not maintained throughout the day.

According to the IFC noise level guidelines and Decree 22/08/2000 presented in the table below, the maximum noise exposure limits in the outdoor environment must not exceed 65 dB.

	IFC Noise Level Guidelines		Decree 22/08/2000	
	1-hr LAeq (dBA)		Daily threshold in dB*	Nighttime threshold in dB (A)*
Receptor	Daytime 7:00 a.m. to 10:00 p.m.	Evening 10:00 p.m. to 7:00 a.m.		
Residential; institutional; Educational;	5	4	55	45
Industrial; commercial	70	70	65	5

*Day and night thresholds are considered for predominantly commercial, industrial or agricultural areas in accordance with Decree 22/08/2000.

It should be noted that there are no adjacent receptors in relation to the solar PV plant, the nearest village is El Mehempla, located approximately 2.3 km.

Project Stage	Construction		Operation		
	The impact will take place during the construction stage.				
Impact Nature	Positive		Negative		
	The impact is negative as it could impact the health or wellbeing of people in the vicinity of construction works, or along the road routes used.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	Air emissions and noise have a direct impact on nearby receptors as it generates an impacted area from the point sources generating the emissions. The impact is reversible as it will stop a short period of time once the source of the emission ceases.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact duration is temporary as the construction machinery will only be in use for a few weeks at each pylon location. Road movements will result in generally a few minutes disturbance assuming a convoy of vehicles are being used at the same time. Blasting is not required for this project to install the pylon foundations.				
Impact Extent	Local	Regional	National	International	
	The impact will occur at a local level (air emissions, dust and noise).				
Impact Magnitude	Negligible	Low	Medium	High	
	The impact magnitude is low. The typical depth of a pylon is 3 to 6 m below ground, and this will not require rock blasting, etc. Sound and emission levels should be relatively low in scale.				
Receptor Sensitivity	Negligible	Low	Medium	High	
	Receptor sensitivity is low as the solar PV plant and pylons will be placed at areas which deliberately avoid being close to a structure or house, for several reasons (not just the generation of air and noise). The risk of impacting a dwelling from these sources of emissions is very low. The closest residential village is located at 2.3 km.				
Gender and vulnerability Considerations	Yes		No		
	There are no gender and vulnerability considerations for this impact. Whilst women typically spend more time inside houses who could therefore be exposed to noise and air emissions more than men.				

Data gaps and further studies required	None.			
Impact Significance	Negligible	Minor	Moderate	Major
	The impact from the generation of air and noise emissions is minor.			
Opportunities	None.			

The following management plans will be developed by the EPC contractor:

- **Pollution Prevention Management Plan (air emissions, dust and noise)**
 - All construction plant and vehicles shall be modern and maintained in accordance with the manufacturer’s specifications, applicable industry codes, or engineering standards to ensure their safe and reliable operation. The generation of a black emissions upon start-up shall be avoided to the extent possible through effective preventative maintenance.
 - All construction plant and vehicles shall be switched off whilst not in use to prevent the unnecessary generation of noise and air emissions.
 - The drivers of construction plant and vehicles shall be trained and provided with equipment that aims to prevent the generation of dust from tyres, and from the transport of spoil and other materials that could generate dust.
 - All construction workers shall be provided trained and provided with equipment which aims to minimise the generation of construction dust. This shall include the use of water sprinklers where this is appropriate to use.
 - The drivers of construction plant and vehicles shall be trained and provided with equipment that aims to prevent the generation of noise (including clanging noises) during the transport of materials and equipment.
 - Where large volumes of materials are stockpiled, these shall be regularly inspected and constructed with minimum slow height to prevent the generation of dust and turbid runoff.
 - Where possible, electricity from the local grid shall be used to provide power at construction sites to avoid the use of portable mobile generators which generate noise and air emissions.
 - The use of noisy equipment (such as the crushing plant) shall be restricted to day-time periods only, defined as 07:00 - 22:00 which is when day-time noise standards apply.
 - When selecting large plant that is to be used for extended periods, preference shall be given to plant that is compliant with EU Noise Directives 2000/14/EC and 2005/88/EC.
 - Avoid carrying out excavation work in harsh weather conditions (heavy rain (1 mm for at least one hour or 10 mm cumulative daily), wind (60 km/h), temperatures: below -2°C, extreme temperatures and fog.
 - Periodic audits shall be undertaken to confirm effectiveness of measures to minimise dust which shall include observations of meteorological conditions including wind speed, direction and general weather conditions.

C.5. The generation of hazardous and non-hazardous waste leading to soil and groundwater pollution.

During the construction phase of the solar PV plant and TL, various waste streams will be generated, including both hazardous and non-hazardous materials. Non-hazardous waste will primarily consist of packaging (wood, cardboard, plastic), scrap metal, inert construction debris, and general domestic waste from workers. Hazardous waste may include used oils, oily rags, empty paint and solvent containers, and spent filters from machinery, all derived from vehicle maintenance activities.

Although the overall volume of waste generated is expected to be low due to the nature and scale of the project, the lack of adequate hazardous waste management infrastructure in Tunisia poses a

challenge. While non-hazardous waste can be transported to regional sanitary landfill sites, hazardous waste will require secure temporary onsite storage and coordinated transport to approved facilities, which may be located outside the region.

The risk of soil and groundwater pollution arises from the improper handling, storage, or disposal of these materials. Poor waste segregation or lack of secondary containment for hazardous substances could lead to accidental leaching or spills, particularly during rainy or windy conditions. While the impact can be prevented through best practice measures, such as banded storage areas and a strict Waste Management Plan, inadequate implementation could result in irreversible environmental harm. Given the sensitivity associated with hazardous waste handling and the absence of local treatment capacity, this impact requires careful planning, even if waste volumes are limited.

Project Stage	Construction		Operation		
	The impact will take place during the construction stage.				
Impact Nature	Positive		Negative		
	The impact is negative. If not properly managed, waste can accumulate on-site, leading to environmental degradation and could impact the health or wellbeing of people in the vicinity of construction works.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The use of waste treatment/disposal facilities is expected to be direct and non-reversible as once space in landfill facilities is used, this will be permanently used. Resources (energy, etc.) will be used to treat wastewater and this impact will be direct upon the infrastructure used.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	Limited to the duration of construction activities, with potential long-term consequences if not managed properly.				
Impact Extent	Local	Regional	National		International
	The waste management facilities that are to be used are present at a regional level.				
Impact Magnitude	Negligible	Low	Medium	High	
	The quantity of waste generated during the construction stage will be low. There are no large quantities of problematic waste streams which will be generated and just small quantities of hazardous waste will be generated.				
Gender and vulnerability Considerations	Yes		No		
	None.				
Receptor Value / Sensitivity	Negligible	Low	Medium	High	
	Tunisia has limited hazardous waste treatment facilities; any contamination could have disproportionate effects due to limited remediation options.				
Impact Significance	Negligible	Minor	Moderate	Major	
	The potential impact significance is Moderate.				
Opportunities	Not applicable				

The following management plans will be developed by the EPC contractor:

- Pollution Prevention Management Plan (Wastewater and drainage)
 - Details of the minimum standards from national legislation and IFC's PS 3 and EBRD's ESR3 associated with the discharge of wastewater into the sewer, surface water, or other receptor. This will involve a comparison between the national standards and IFC's PS 3 and EBRD's ESR3 with the stricter standard being adopted.
 - Details of national permits, licences and authorisations that are required to discharge wastewater.
 - All wastewater to be discharged shall be tested for its quality and compliance with the Project Standard before being disposed of.
 - A site-specific assessment shall be conducted to check that the selected disposal site is suitable for the volume and quality of water which is planned to be discharged.
 - The volume and sources of wastewater discharged shall be recorded along with the results

- of the testing.
 - All sewage generated shall be contained into a tank and transferred to a municipal sewage treatment facility in accordance with the Waste Management Plan.
 - Details of temporary drainage arrangements to ensure that parts of the site do not flood if they are subjected to periods of heavy rainfall.
- Waste Management Plan
 - Details of a Waste Inventory that reflects the expected quantity, type and hazardous classification of wastes generated, along which waste types can be recovered and recycled. The inventory will indicate when during the construction stage of the project, large quantities of waste will be generated so that the management of high waste volumes can be planned in advance.
 - A Waste Register that reflects how the different types of waste will be recovered, recycled or treated/disposed of, and where the final destination of the waste materials could be after being subjected to a detailed audit (see below).
 - Details of how potential waste contractors are to be audited to ensure that they have the internal capacity to meet the applicable requirements of national legislation and Good Industry Practice.
 - Details of how potential waste management facilities are to be audited to ensure that they are being operated in accordance with national legislation and GIP.
 - An up-to-date register of approved waste management contractors and waste management facilities who have been subjected to a successful audit.
 - Details of a chain of custody system that will track the movement of waste materials from the point of generation to their final destination point, recording how waste is passed between different companies and locations. The chain of custody shall include the following: unique reference number, quantity of waste, waste description and classification status, date of shipment, place of origin or movement, destination, waste transport provider, receiver data and waste acceptance declaration.
 - Details of how waste generated at each construction site shall be segregated using a simple colour coded system and signage.
 - **Solid waste management** Identify authorized sites for the disposal of solid waste generated across construction. Organize and monitor solid waste collection, sorting and disposal to these sites during construction and operation
 - **Circular economy** Supply the Project with electrical and electronic equipment that meet the requirements of Directive 2011/65/EU, so that they can later be sufficiently recycled. Require PV panels suppliers to meet the key objectives of WEEE directive in terms of the collection, treatment, recovery and environmentally sound disposal of WEEE:
 - Panels that are delivered broken during the construction period must be disposed in a facility with the technical capacity to recycle their components, at the expense of the supplier. The supplier must provide a proof of delivery of the broken panels to such facility.
 - Panels that are broken or out of order during construction or operation must be disposed according to the WEEE directive at the expense of the supplier.
 - How waste storage containers shall be securely stored, banded (where required), fenced off, and labelled including details of international hazard labels and the applicable UN code where required for hazardous waste materials.
 - How waste storage areas at each construction stage shall be subjected to a weekly visual inspection.
 - Coordination with the ANGED for the collection of non-hazardous waste from the site;
 - Use of the services of specialised companies authorised by the Ministry of the Environment (ME) for the management of hazardous waste (the list of companies authorised for the management of hazardous waste is available on the ANGED website). If necessary, an area

will be reserved for the temporary storage of hazardous waste on site;

C.6. The use of water for construction of the solar PV plant and TL and the workforce leading to a reduction in the availability of this resource to other users.

During the construction phase water will be required for multiple activities, including concrete preparation for foundations, dust suppression on unpaved access roads, and consumption by the onsite workforce. The quantities involved are expected to be moderate (5,500 m³) and typical for a project of this scale, with the PV solar plant site requiring more water than the TL due to larger surface preparation and infrastructure requirements.

Despite the relatively limited volume, the use of freshwater resources in a water-scarce region such as Menzel Habib could result in localised competition with other users, particularly if groundwater is used. Over-abstraction may cause a temporary reduction in the availability of water for nearby communities, agricultural uses, or livestock, especially during peak summer months. The impact depends largely on the source, volume, and sustainability of water abstraction. If water is obtained from public supply or licensed boreholes with verified recharge, the risk to surrounding users will be low. However, in the absence of a clear water sourcing strategy, indirect stress on local water tables could occur.

Project Stage	Construction		Operation		
	The impact will take place during the construction stage.				
Impact Nature	Positive		Negative		
	The impact is negative. If not properly managed, excessive water use can strain local water resources, especially in water-scarce regions. This could affect the availability of water for nearby communities, agriculture, and natural ecosystems.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	Water usage is expected to be reversible assuming that the water supply has a recharge mechanism.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	Impact is limited to the construction phase only.				
Impact Extent	Local	Regional	National	International	
	The impact could occur at a regional level as multiple water sources could be used				
Impact Magnitude	Negligible	Low	Medium	High	
	Water demand is relatively low, though cumulative effects with nearby projects may increase pressure.				
Gender and vulnerability Considerations	Yes		No		
	Not applicable				
Receptor Value / Sensitivity	Negligible	Low	Medium	High	
	Medium due to the lack of water supply in the region and that Tunisia is a water scarce country.				
Impact Significance	Negligible	Minor	Moderate	Major	
	The potential impact significance is minor.				
Opportunities	Not applicable				

The following management plan will be developed by the EPC contractor:

- Water resources Management Plan
 - Prepare a hydrological study to demonstrate that there is sufficient groundwater available for abstraction and that the usage by the project will not result in significant depletion.
 - Coordinate with the relevant authority (CRDA) to determine the most feasible and practical approach to meeting the Project's water needs.
 - The steps to be taken to minimise the use of freshwater resources during the construction stage,
 - Details of the future volume of water required during the construction stage and where this is to be sourced from.
 - Details of national permits, licences and authorisations that are required to abstract water from the identified sources.

- Document the project's water consumption during construction (monthly).
- **General**
 - Systematically review material inputs and design for resource efficiency through minimising material use, use of prefabrication, selecting lower embodied-energy or recycled products and/or specifying lower maintenance-interval solutions.
 - Internal training, awareness raising activities, monitoring using KPIs, and roles and responsibilities.

8.1.1.2 Impacts on the biological environment

Construction activities could lead to habitat alteration and therefore potentially disturb existing habitats (flora, fauna and avifauna). Certain construction operations, such as brush clearing, earthworks or vehicle traffic, may result in the accidental death of local wildlife. Other impacts on biodiversity are mainly due to poor management, which could include inappropriate driving and maintenance practices by workers (hunting of animals, dumping of hazardous waste on the ground).

C.7. Potential impacts on habitats and species of flora

The construction phase of the solar PV plant and the TL will have an impact on local vegetation, although it is mainly composed of common, non-threatened steppe species. Earthworks will result in the complete removal and trampling of the plant species present on the site. However, the majority of the site is composed of bare soil (59.9%), but also of low vegetation (35.7%), medium vegetation (3.7%) and dense vegetation (0.7%). The site is dominated by sparse steppe vegetation typical of arid environments, such as *Astragalus armatus*, *Haloxylon salicornicum*, *Anabasis articulata*, and *Gymnocarpos decander*, as well as clumps of *Zizyphus lotus* located in the wadi bed. However, none of these species are classified as rare or endangered. Furthermore, the study area is part of a larger area with the same plant communities, where temporary loss or decline in community density does not significantly alter the biodiversity balance.

Project Stage	Construction		Operation		
	Habitat clearance and ground disturbance will occur during solar PV site preparation and pylon installation along the TL corridor.				
Impact Nature	Positive		Negative		
	The impact is negative in that habitats and species of flora may be affected by the various project activities detailed above.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	Reversible where natural vegetation can regenerate or be restored; irreversible if protected species are removed.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	Short-term for temporary clearance				
Impact Extent	Local	Regional	National	International	
	The extent is expected to be local, Restricted to within the PV solar plant footprint and the TL corridor at each pylon location.				
Impact Magnitude	Negligible	Low	Medium	High	
	the study area is part of a larger area with the same plant communities, where temporary loss or decline in community density does not significantly alter the biodiversity balance.				
Receptor Sensitivity	Negligible	Low	Medium	High	
	The project site lies within a semi-arid steppe environment with low regeneration capacity.				
Gender and vulnerability Considerations	Yes		No		
	NA				
Data gaps and further studies required	NA				
Impact Significance	Negligible	Minor	Moderate	Major	
	The potential impact significance is minor.				
Opportunities	Not applicable				

Refer to the Biodiversity Management Plan (flora and fauna) listed in fauna section.

C.8. Potential Impacts on terrestrial fauna

During the construction of the solar PV plant, some areas will be changed due to the work. Clearing, earthworks, and leveling will partly destroy vegetation and natural shelters. This can directly affect terrestrial animals, especially those that move little or live in the ground, such as certain insects, reptiles, and small mammals. In addition, disturbances generated by the construction site, such as noise, vibrations, vehicle traffic and dust, will have a disruptive effect on local fauna, which may lead to avoidance behaviour, the temporary displacement of certain species or abandonment of burrows or breeding sites. Accidental mortalities may also occur, particularly when animals are buried in trenches, the soil is compacted or heavy machinery movements. In addition, inadequate site management (e.g. waste disposal, opportunistic hunting by workers, uncontrolled destruction of habitats) could increase pressure on local fauna. The confirmed presence of *Androctonus australis*, a venomous scorpion species widely found in arid environments, poses a risk to the health and safety of workers. The terrestrial fauna recorded in the project area is typical of the arid steppe environments of southern Tunisia. It mainly includes burrowing rodents (gerbils, jerboas, sand rats), canids (foxes, wolves), as well as potentially present species such as hares (*Lepus capensis*), desert hedgehogs (*Paraechinus aethiopicus*) and gundi (*Ctenodactylus gundi*). Among reptiles, several species have been identified, including *Mesalina olivieri*, *Trapelus mutabilis* and *Stenodactylus mauritanicus*, and potentially *Cerastes cerastes* or *Naja haje*. The invertebrate fauna is represented by eleven insect species, including a single individual of the endemic subspecies *Eremiaphila denticollis tunetana*, as well as *Androctonus australis*. None of these species are classified as Endangered (EN) or Critically Endangered (CR) according to the IUCN Red List (version 2025.1). The majority of species recorded in the project area are well adapted to arid and steppe conditions. Their presence indicates a resilient fauna capable of adapting to environmental variations, and most animals, particularly rodents, have a good ability to move or recolonise similar habitats.

Project Stage	Construction		Operation		
	Habitat clearance and ground disturbance will occur during solar PV site preparation and pylon installation along the TL corridor.				
Impact Nature	Positive		Negative		
	Risks include direct mortality (crushing), habitat degradation, and disturbance of faunal species, including venomous reptiles and burrowing mammals.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	Some impacts (e.g., disturbance) are reversible; others (e.g., mortality of individuals or destruction of burrows) may be irreversible without mitigation.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	Short-term where fauna is temporarily displaced; permanent if habitat is lost and individuals are not relocated or able to recolonize.				
Impact Extent	Local	Regional	National	International	
	The extent is expected to be local, Restricted to within the PV solar plant footprint and the TL corridor at each pylon location.				
Impact Magnitude	Negligible	Low	Medium	High	
	No IUCN-threatened species were recorded; however, direct mortality risk (e.g., crushing of reptiles and small mammals) remains localized and avoidable.				
Receptor Sensitivity	Negligible	Low	Medium	High	
	Although fauna is ecologically adapted to arid environments, species like burrowing rodents and reptiles may be vulnerable to earthworks and vehicular traffic.				
Gender and vulnerability Considerations	Yes		No		
	NA				
Data gaps and further studies required	NA				
Impact Significance	Negligible	Minor	Moderate	Major	
	Due to the absence of threatened species and the localized, avoidable nature of impacts; significance remains low with planned mitigation.				
Opportunities	Not applicable				

The following management plan will be developed by the Developer and implemented by the EPC contractor:

- Biodiversity Management Plan (flora and fauna)
 - The EPC Contractor will enforce speed limit of 15-20 km/hour to minimise risks to flora and fauna.
 - The EPC Contractor will prohibit the use of pesticides and fire to clear the vegetation.
 - The EPC Contractor will reduce the footprint of runways and material storage sites to minimise possible impact on the vegetation cover.
 - The EPC Contractor will optimise the movement of machinery involved in earthworks, land clearance, the construction and use of access roads, the installation of pylons, foundation work, cabling, the transit of lorries and machinery, the loading and unloading of lorries, etc., in order to limit their impact on flora and habitats.
 - The EPC Contractor will install fences around the camping and equipment storage areas to limit encroachment on the natural area during the works phase.
 - The EPC Contractor will provide for ongoing training and awareness-raising (at the start of work and once a month depending on the number of workers) for all project employees in waste management practices in order to avoid and reduce the risks of waste production and its potential impact during the construction phase.
 - To prevent the introduction of invasive plant species during the works, the EPC Contractor will ensure the machinery is cleaned before it arrives on site. Quality controls will also be carried out on the materials brought to the site.
 - It is generally expected that the implementation of the above measures is likely to restore the existing habitat to pre-construction status wherever possible.
 - EPC Contractors shall educate workers and other stakeholders about environmental concerns, in particular poaching and the ban on consumption of bushmeat.
 - EPC Contractors shall prohibit hunting and any cause of disturbance or trade in animals.
 - EPC Contractors and Community Liaison Officers shall report any acts of disruption or vandalism committed by the workforce.
 - EPC Contractors shall limit and fence the construction site/area to strictly necessary and respect the site boundaries.
 - EPC Contractors shall organise, before the start of earthworks, several deterrent campaigns (using adequate and well tested equipment/methods) to enable reptiles and other small fauna likely to be present on the project site to flee the work area.
 - Less mobile animals (e.g. reptiles, scorpions) encountered during work must be safely relocated by trained personnel. A procedure for capturing and relocating species shall be developed and implemented.
 - Lighting at night must be avoided to prevent disturbance to nocturnal fauna
 - EPC Contractors shall ensure that site areas and the living quarters are kept clean and that good waste management practices are applied, to guarantee the elimination of sources of food attraction.
 - EPC Contractors shall inform employees and contractors working on site of the protected species/habitats potentially present in the area, in order to ensure constant monitoring and to promote mitigation measures or actions to be taken in the event of an encounter with wild animals.
 - Allow natural recolonisation of restored areas where feasible.

C.9. Potential impacts on Avifauna

The potential impacts on avifauna are expected mainly during the construction phase of the project, due to noise disturbance, vibrations and the movement of construction machinery. These

disturbances may cause temporary distribution to birds, particularly during sensitive periods of nesting, feeding or migration. Ornithological surveys carried out on 14 February 2025, which remain specific to the winter season, the beginning of the spring migration and the beginning of songbird nesting, identified 12 bird species belonging to 8 families. No raptors or waterbirds were observed on the site, indicating that there are no major potential ornithological issues. Only one species of particular interest has been identified: the southern grey shrike (*Lanius meridionalis*), classified as "Vulnerable" on the IUCN Red List (2025.1) and on the national list. A second survey, conducted on 20 August 2025 during the autumn migration period using the transect method, recorded 11 bird species, including one raptor (Long-legged Buzzard - *Buteo rufinus*), Common Ravens, and nine small sedentary passerines. No signs of autumn migration were detected during this visit. The Long-legged Buzzard is classified as Near Threatened (NT) at the national level, while assessed as Least Concern (LC) globally (IUCN 2025.1). Most of the observed species are mainly sedentary nesters, well adapted to a partially anthropized environment. Their high ecological plasticity allows them to adjust to changes in their habitat. In addition, the surrounding landscape is largely homogeneous steppe grassland, offering numerous similar habitats in the wider area. This provides birds with opportunities to relocate easily, thereby limiting the potential impact of habitat loss or disturbance from the planned project activities. The project site is located approximately 3 km from the Sebkhet Sidi Mansour Ramsar-designated wetland. However, no functional interaction between this wetland and the project site has been identified, and no ecological exchange likely to trigger a Critical Habitat criterion has been identified.

Project Stage	Construction		Operation		
	Habitat clearance and ground disturbance will occur during the solar PV site preparation and pylon installation along the TL corridor.				
Impact Nature	Positive		Negative		
	Disturbance, displacement, or potential destruction of nests and roosts for bird species of conservation concern.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	Reversible when disturbance is temporary and birds can recolonize post-construction. Irreversible if nesting sites are destroyed or breeding success is compromised.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	Disturbances are temporary.				
Impact Extent	Local	Regional	National	International	
	Confined to the solar PV plant, TL corridor, and immediate surroundings.				
Impact Magnitude	Negligible	Low	Medium	High	
	Potential nest destruction may affect species listed as NT and VU at national or global levels. However, the limited scale of the site and low bird densities moderate overall magnitude.				
Receptor Sensitivity	Negligible	Low	Medium	High	
	The solar PV plant site is not located on a recognised bird migration corridor and is approximately 3.2 km from Sebkhet Sidi Mansour. A study of the general geographical context shows that it is impossible for waterbirds to migrate between the project site and this wetland of conservation interest.				
Gender and vulnerability Considerations	Yes		No		
	NA				
Data gaps and further studies required	NA				
Impact Significance	Negligible	Minor	Moderate	Major	
	The presence of nationally protected species and PBF EBRD.				
Opportunities	TL pylons may offer additional nesting sites for some raptors.				

The following management plan will be developed by the Developer and implemented by the EPC contractor:

- Biodiversity Management Plan (avifauna)
 - To reduce impacts non continental nesting birds, whether of interest or not, the Developer

shall ensure that work begins after the nesting period for these species, particularly during the winter season. Indeed, clearing and levelling work should preferably take place outside the breeding season of birds (March to July). If there is a major reason for carrying out the work during this phenological period, the EPC contractor must appoint an ornithologist to confirm the presence or absence of sensitive species. Where applicable, an exemption may be requested to allow works to proceed, provided this does not compromise the reproduction of the species (for example, if the species is absent from the project footprint or restricted to an area more than 350 meters away from the construction zone).

- The sensitivity of nearby protected area, Sebkheth Sidi Mansour must be communicated to all workers.
- EPC Contractors shall ensure that site areas and the living quarters are kept clean and that good waste management practices are applied, to guarantee the elimination of sources of food attraction which are known to affect birds.
- Add insulation to existing poles and wires to reduce the risk of electrocution to birds or other wildlife in the event of contact.

8.1.1.3 Impacts on the social environment

C.10. Labor and working conditions

The provision of poor-quality working conditions to the workforce (including GBVH) leading to a reduction of wellbeing and risk of regulatory enforcement due to violations of national labour legislation.

The construction workforce will mainly comprise 450 people (350 unskilled workers and 100 skilled workers). Unskilled workers will be recruited by the EPC contractor from the local community.

The non-local workforce will be accommodated in a worker camp, or accommodation facility in the region. The type and location of the facility used will be made by the EPC contractor. Local workers will be provided with transport to/from the site each day, free of charge.

There is a risk that EPC personnel and local workers hired by the EPC contractor may be subject to inadequate working conditions. These may include, for example, excessive working hours and involuntary overtime, wages below market rates and/or national minimum wage legislation, gender-based violence and harassment, lack of legally required social insurance, and lack of accurate information about workers' rights and employment rights in a format they can easily understand. Poor relations between management and workers risk damaging the well-being of the latter and could lead to protests and/or work stoppages.

Additionally, the non-local workforce could be provided with poor quality accommodation such as overcrowded rooms, low levels of food and water hygiene, inadequate sanitation facilities, poor electrical and fire safety, a lack of access to medical and occupational services, and low security leading to risks from theft from outsiders.

The non-local workers may create a strain on existing infrastructure, mainly water and sanitation systems, as well as road accidents and other adverse consequences of the increased traffic generated by the project (dust, noise and pollution). In addition, the presence of a large number of workers, mainly men, may lead to an increased spread of communicable diseases. Women, especially young girls, are threatened by the presence of the incoming workforce seeking sexual services. Interactions between incoming workers and women are likely to increase the incidence of communicable diseases, raise tensions and increase gender-based violence.

The characteristics of the impact on the construction sector workforce of low labor standards and working conditions are assessed in the table below.

Project Stage	Construction		Operation		
	The impact is relevant to the construction stage when the workforce will be used for the Project.				
Impact Nature	Positive		Negative		
	The impact is negative because poor working conditions could have consequences for occupational health and safety, labor exploitation due to the need (for example) to work excessive hours or harassment leading to a reduction in their overall well-being, the enforcement of regulations by the Tunisian labor inspectorate, and a reduction in income and other employment-related benefits to which they are entitled under national legislation, PS 2 of IFC and ESR 2 of EBRD: Labor and working conditions. Additionally, the non-local workforce could be provided with poor quality accommodation leading to a decrease in their physical and mental well-being.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is direct because it affects the general wellbeing of individual workers and their households who rely on the health of adults to generate income into their home, and the quality of accommodation provided to them. Depending upon the consequences of any violation in labour standards that occurs, the impact could be reversible or irreversible. For example, mental stress and anxiety can ease over time, whilst the loss of income arising from workers being underpaid could be irreversible unless the underpayment is addressed.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact is temporary as construction works are expected to continue for a period of a few months. However, if a worker is underpaid then this impact could continue permanently as it would comprise loss of income.				
Impact Extent	Local	Regional	National	International	
	The impact will occur at a local level where workers are present.				
Impact Magnitude	Negligible	Low	Medium	High	
	Impact magnitude is medium as the entire workforce will potentially be exposed to poor working conditions.				
Gender and vulnerability Considerations	Yes		No		
	Women who comprise part of the workforce may be subjected to harassment in the workplace. Workers with low levels of literacy may not be able to fully understand their working employment contracts, HR policies and procedures, and other information concerning their employment and legal rights. Females may be at heightened risk in worker accommodation facilities of GBVH.				
Receptor Value / Sensitivity	Negligible	Low	Medium	High	
	Receptor sensitivity is high as the safety and wellbeing of the workforce is the highest priority.				
Impact Significance	Negligible	Minor	Moderate	Major	
	Given the remoteness of the site where the camp (if used) may be located, and the prevailing gender dynamics in Tunisia. Specific steps must be taken to prevent GBVH from taking place amongst the workforces. Women must also feel empowered to apply for local employment positions, equally to men.				
Opportunities	None.				

The following management plans will be developed by the EPC contractor:

- Local recruitment plan
 - A summary of requirements for equal opportunity from national legislation and PS2/ESR2.
 - Details of the temporary employment roles that will be generated during the construction stage.
 - Details of how accurate and timely information associated with the generation of local employment opportunities is to be disclosed in a culturally appropriate format, including:
 - Details of when local employment opportunities are likely to be generated and advertised for the Project.
 - Details of how and where advertisements will be placed.
 - The process used to evaluate and recruit local people, so that this is fair and transparent, and perceived by others to be fair.
 - Details of how grievances associated with local recruitment can be raised by local people, or other stakeholder, should they wish to do so, using the Community Grievance Mechanism.

- Details of how women and vulnerable people will be specifically invited to apply so that opportunities are not just allocated to local men and non-vulnerable people.
- Details of the role of the regional government to oversee the process so that local people do not become frustrated towards the Project.
- Human Resources Management Plan and Human Resources Policies :
 - The following policies: Equal Opportunities Policy, a Working Hours and Voluntary Overtime Policy, Human Rights and Modern Slavery Policy, and Occupational Health and Safety Policy.
 - A summary of worker's legal rights and obligations of the employee and employer reflected by national legislation, international Labor Organisation (ILO) conventions, and PS2/ESR2.
 - A summary of the numbers and job description profile required for the construction stage, when this is expected to occur, the expected duration of employment, and the various roles between low-skilled, skilled, and highly-skilled workers, and how local employment positions are to be preferentially offered to the target groups identified above.
 - A description of the process used to recruit people, including details of how positions are to be publicly advertised, how candidates can apply and what support shall be provided to candidates seeking to apply who are not able to complete an application form for any reason (language barriers, etc.), how candidate details shall be recorded on a central register/database, and how candidates shall be individually screened based upon a clearly defined criteria for each role to determine the suitability of candidates against specific job requirements
 - Details of how workers will be able to obtain a fitness to work certificate following a medical examination which shall be organised and paid for by the employer.
 - A prohibition of recruitment of local people spontaneously (at working sites, etc.) to prevent people from moving towards the sites seeking work. Any person wishing to apply for an employment position must follow the formal procedure and people will not be employed 'on the spot'.
 - Targets for women to form a part of the low-skilled, skilled, and highly-skilled construction workforce, and details as to how women shall be specifically encouraged to apply for employment positions.
 - Details of the Community Grievance Mechanism that can be used to raise a concern about the way in which local people are being recruited, and the Worker Grievance Mechanism which can be used to raise a concern during their employment.
 - The outcome of a supply chain risk assessment, procurement questionnaire and audit protocol to check for the potential for forced and child labour to be present in the supply chain of the EPC contractor.
 - How the legal rights and terms and conditions of employment are to be provided to workers at the start and periodically during their employment using a Worker Handbook (or other type of document). This will include details of the Worker Code of Conduct, their salary and payment process, right of freedom of association and collective agreements, severance pay, working hours, overtime payments, tax and other types of deductions, provision of occupational health and safety insurance, data protection, appraisals, disciplinary policy and procedures, emergency leave arrangements, maternity and paternity leave entitlements, probation arrangements, redundancy procedure, sickness and absence policy, stress at work, request for unpaid leave, whistleblowing policy, and training policy.
 - Details of the training activities that each worker shall be provided with, including initial induction training on the Worker Code of Conduct and HSE.
 - A reference to the Worker Code of Conduct which must be signed by all workers, and how workers will be reminded of their expected standard of behaviour on a regular basis.
 - Details of the Worker Grievance Mechanism which shall be available during the initial recruitment process and throughout their duration of employment.
 - Details of a 'whistle-blower hotline' where allegations of bullying or harassment can be reported anonymously (to be administered by the Developer).
 - How temporary workers shall be reminded about the temporary nature of their work during

their employment, and providing them with adequate notice prior to termination, so that notification does not come as a sudden shock and trigger resentment or protests. A Retrenchment Plan will be prepared and implemented by the EPC contractor, if this is required.

- How worker-employee relationships shall be managed through regular meetings between management and workers, including the use of worker representatives.
 - A commitment to provide a certificate to each worker that describes their job title, roles and responsibilities, vocational training received (if any) and any certifications, duration of employment, and contact details for a future employer to use to check that the information contained therein is accurate and valid once their involvement in this Project is complete.
 - How the above arrangements will be applied (and checked) to the internal supply chain companies of contractors.
 - Internal training, awareness raising activities, monitoring using KPIs, and roles and responsibilities.
- Worker Accommodation Plan (if required):
 - All worker accommodation shall be constructed and operated in accordance with the applicable content of the IFC/EBRD publication entitled: “Workers’ accommodation: processes and standards - A Guidance Note (2010)”. This includes details of the minimum control specifications covering fire safety, electrical safety, the availability and quality of sanitation facilities, the security of worker’s personal belongings, food safety, the availability of drinking water, air conditions/heating, the availability of recreational activities, and gender separated bedrooms and sanitation facilities.
 - Details of how entry into accommodation units shall be controlled using designated entry/exit points staffed by security personnel.
 - The medical examination programme.
 - Initial training and awareness sessions on the risks associated with the most common contagious diseases (the flu virus), communicable diseases, general hygiene measures, code of conduct to be implemented and others, as appropriate.
 - A commitment for each building used to have an emergency response plan to ensure the safe evacuation of workers in the event of a fire or other type of emergency, with fire exits clearly marked and kept free of obstructions, and how the plan will be regularly tested using fire drills.
 - Details of how workers are to be provided with medical advice and support free of charge. Workers requiring specialist advice or treatment shall be transported to the nearest government medical centre.
 - Monthly meetings shall be held between management representatives and worker representatives, to discuss the conditions of the accommodation and facilities.
 - A reference to the Worker Code of Conduct.
 - Internal training, awareness raising activities, monitoring using KPIs, and roles and responsibilities.
 - Worker Code of Conduct and Security Personnel Code of Conduct
 - A requirement for all workers to:
 - Prioritise the safety of themselves and other people in the workplace.
 - Exercise their right to ‘Stop Work’ if they see an unsafe act in progress.
 - Look after the Personal Protective Equipment (PPE) which is issued to them and ensure that it is correctly used when necessary to do so.
 - Report any incident, near-miss, or other issue of concern to their immediate supervisor as

quickly as possible.

- Not consume any illegal substances such as alcohol or illegal drugs, comply with the random alcohol testing programme that shall be in place, and to ensure that all prescribed medication taken in the workplace is approved in advance in writing by a Site Medical Officer.
- Never behave in a way that could be considered by others as being offensive, disrespectful, bullying, or harass another member of the workforce, or a member of the public.
- Never allow race, colour, religion, gender, age, national origin, sexual orientation, gender identity, marital status, disability, or any other characteristic to influence their judgement when it comes to their attitude or behaviour towards others in the workplace, including colleagues, suppliers or members of the public.
- To be informed of the importance that the workplace is suitable for the presence of women, and that GBVH is prohibited in the workplace.
- Never distribute or display offensive material, including inappropriate pictures, cartoons, and symbols of hatred.
- Inform your immediate supervisor if a member of the public or other person (such as a worker in a supply chain company) approaches you to raise a grievance.
- A requirement for all security personnel (in addition to the above) to:
 - Wear uniform always so that they can clearly be identified as a security personnel and display their unique identification badge clearly.
 - Be friendly when greeting all visitors, undertaking duties in a professional manner.
 - Never abuse their position of authority.
 - Only use force is absolutely necessary and in proportion to the scale and magnitude of the threat.
 - Never carry or use an item which could be considered threatening, including firearms, unless it is absolutely necessary to do so and use only in reasonable and proportionate measures.
 - Report all security incidents to their immediate supervisor without delay.
 - Cooperate with government-provided security personnel at all times.
 - Internal training, awareness raising activities, monitoring using KPIs, and roles and responsibilities.
- Worker Grievance Mechanism
 - A description of the process that can be used by a worker to raise a grievance about any aspect of the Project, including the ability to submit an anonymous complaint, and which assures the confidentiality of complainants.
 - A description of the process to be used to record, investigate, and report back to the persons raising the grievance, throughout the resolution process.
 - Details of an appeals process should the person raising the grievance not accept the proposed resolution.
 - Details of how the existence of the worker grievance mechanism will be raised amongst the workforce and how the effectiveness of the awareness raising activities shall be monitored.
 - The provision of support to workers to register a complaint should this be needed.
 - Details of how the confidential nature of grievances shall be maintained.
 - Internal training, awareness raising activities, monitoring using KPIs, and roles and responsibilities.

NOTE: To assist in the implementation of the Worker Code of Conduct, the Developer will appoint a GBVH focal point and provide regular training and communications for

employees and contractors on understanding GBVH risks in the workplace

- Local recruitment plan: To provide training to the Developer’s E&S department and senior managers inside the organisation on the following topics:
 - Stakeholder engagement and grievance management;
 - Labour and working conditions,
 - Community health and safety;
 - Pollution prevention and control;
 - Safety and security management;
 - The eLearning course developed by EBRD on the E&S management of contractors
 - The eLearning course developed by EBRD on stakeholder engagement.

- Ensuring that the Workers and CLO are adequately trained in engagement techniques, including the management of GBVH grievances from a local community resident, member of the workforce, or other stakeholder. The GRM will refer GBVH complaints to the Tunisian Red Crescent and record the resolution of the complaint process.

C.11. The presence of child and forced labour at the workplaces of supply chain companies

The use of a supply chain by the EPC Contractor, introduces the risk of child and forced labour in the workplaces of the businesses used. Tunisia has a substantial component of the workforce that is active in the informal sector (the informal sector comprises 35.5% of the economy in 2023), and in 2022 the informal sector employed 58.8% of the labour market. The below table sets out the likely impacts from potential labour violations within the supply chain.

Project Stage	Construction		Operation		
	The impact is relevant to the construction stage when the EPC Contractor is procuring materials for the Project.				
Impact Nature	Positive		Negative		
	The impact is negative. The possibility of resorting to child labor and forced labor can lead to injuries or deaths, mental distress and anxiety, protests, and work stoppages. Violations of national labor laws, which prohibit child labor and forced labor, could result in enforcement actions against the company and, potentially, the EPC contractor and developer. The reputation of the developer, the IFC and EBRD could also be affected if the project received negative attention from the international media due to the use of suppliers where child labor and forced labor are present.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is direct because it affects the safety and wellbeing of supply chain workers. Depending upon the nature of any long-term consequences of exploitation, the impact could be reversible or irreversible.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The risk of the impact occurring is short-term to permanent as whilst supply chain companies will be used during the construction stage to procure materials and services, impacts to the individuals affected could be permanent.				
Impact Extent	Local	Regional	National		International
	The impact could occur at a local to international level as it depends where the workplace of the supply chain workers is located.				
Impact Magnitude	Negligible	Low	Medium	High	
	Impact magnitude is medium as whilst a small number of companies are expected to be used by the EPC Contractor and most of the suppliers of the PV and pylon components and conductors are of a specialist nature and will be procured from reputable companies with established management systems, the procurement of solar panels is a source of risk from the potential presence of forced labour in the supply chain.				
Gender and vulnerability Considerations	Yes		No		
	There are substantial gender and vulnerability considerations associated with this impact. Ethnic minorities, migrants, women and children are particularly vulnerable from labour exploitation, as well as those who are low-skilled and have a low education and alternative means of earning income. The rising cost of living in Tunisia may also result in workers being unable to raise concerns about their working conditions for fear of retaliation, and the need to secure their future employment to maintain their standard of living.				
	Negligible	Low	Medium	High	

Receptor Value / Sensitivity	The sensitivity is high as the safety of the workforce, including supply chain workers, is of the highest importance.			
Impact Significance	Negligible	Minor	Moderate	Major
Opportunities	As the suppliers to be used are unknown. There is an opportunity to raise awareness about the presence of child and forced labour in Tunisia amongst the construction sectors.			

- **Supply Chain Management Plan** will be developed by the EPC contractor.
 - Details of the core suppliers to the EPC contractor and a profile of the labour risks associated with each economic sector such as (for example) the PV solar panels.
 - The outcome of a risk assessment to indicate the likelihood and consequence of supply chain risks in each economic sector and company used.
 - How the EPC contractor will be obliged to select low-risk suppliers, where it is possible to do so.
 - Details of legally binding agreements the Developer will require the EPC contractor to have with its supply chain of companies to incorporate the prohibition and prevention of forced labour, child labour, and significant life safety risks.
 - A description of the scope of audits and inspections to be undertaken at a supplier’s workplace/facility, depending on the outcome of the risk assessment.
 - Details of how the Developer will require the EPC contractor to disengage from suppliers where significant audit findings are not rectified in a reasonable period of time.

C.12. The capital spends by the EPC Contractor on businesses supplying materials and services, leading to an increase in revenue to the owners of the businesses used and potentially an increase in their workforce.

The developer's capital expenditures with the EPC contractor and its internal network of supply chain companies for the acquisition of materials and services will result in increased revenues for the companies used, potentially increased profits depending on the costs incurred by the company and may also result in an increase in the company's workforce.

The materials and services to be purchased are as follows:

- The services of an EPC contractor and construction workers.
- Components for the solar PV plant and TL (foundation, fence, steel pylons, cable conductors, and other electrical equipment).
- Construction and cable laying machinery, hand tools, and PPE.
- Food, water, and catering services for the construction workforce.
- Accommodation facilities and payment for land temporarily leased for the establishment of a camp and storage areas (if used); and
- General transportation and logistics services.

The characteristics of this impact are assessed below

Project Stage	Construction	Operation		
	The impact will occur during the construction stage of the Project where businesses will be used to provide materials and services to the Developer, almost all of which will be channelled through a single EPC Contractor.			
Impact Nature	Positive	Negative		
	The impact is positive because the use of companies will generate increased revenues, profits (hopefully) and additional economic growth thanks to the economic multiplier effect, whereby the companies used then spend part of their revenues within their network of small and medium-sized enterprises (SMEs). For example, the EPC contractor is likely to outsource catering, accommodation, and logistics services to SMEs. As capital expenditures trickle down through supply chain networks, tax revenues will be generated, benefiting the government and contributing to the country's continued development.			
	No negative impact is expected, as capital expenditures are not likely to cause a shortage of materials and services for other customers of the companies, nor inflationary pressure on these products, as the expenditures are relatively low compared to the production of green energy and their positive impact at the regional and national levels.			
Impact Type	Direct	Indirect	Reversible	Irreversible

	The impact is direct in terms of revenue generation for businesses and tax contributions to the government. Indirect benefits may arise from the reinvestment of public tax revenues into national development programs. The impact is irreversible as whilst the capital expenditure will continue throughout the construction stage, the increased profits and expansion of the workforce (where this occurs), could have a lasting upon the business owners and individuals employed.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact is short-term, if not permanent. Construction work is expected to continue throughout the construction period. However, the increase in revenue could have lasting effects.				
Impact Extent	Local	Regional	National	International	
	The impact is expected to occur at a local, governorate, national, and international level that reflects the location of businesses used. For example, an international supplier will be used by the EPC Contractor for the supply of the PV module, pylon components, the conductors, and electrical equipment. National, regional, and local businesses may be used for catering and logistics. The geographical distribution of the impact is entirely linked to the location of the business itself where profits are directed to, and the location of the workforce.				
Impact Magnitude	Negligible	Low	Medium	High	
	Impact magnitude is low to medium as the capital expenditure could comprise a small to moderate proportion of the existing revenue of businesses used. Whilst the workforce of the businesses used could expand, it is unlikely to result in a major expansion.				
Receptor Sensitivity	Negligible	Low	Medium	High	
	Receptor sensitivity is medium as businesses will welcome the chance to provide materials and services to the construction stage, particularly businesses based in Tunisia given the recent challenging socio-economic context.				
Gender and vulnerability Considerations	Yes		No		
	There is an opportunity for the EPC Contractor to procure services and materials from SMEs that are either owned by women or employ a high proportion of women amongst their workforces. This could include, for example, the procurement of PPE, catering and cleaning services.				
Impact Significance	Negligible	Minor	Moderate	Major	
	The impact significance is minor to moderate				
Opportunities	Identify SMEs based in the governorate of Gabes and among local communities close to the Menzel Habib delegation that are owned by women and/or have a significant proportion of female workers, so that women business owners benefit from the project. Prepare and implement a local procurement policy that preferably targets local SMEs to supply construction materials and services to the EPC contractor.				

The initial identification of SMEs in communities located in the Governorate which could be used to supply materials and services to the EPC Contractor. This could include, for example, the provision of catering and cleaning services, the provision of uniforms, and other materials/services. Identification and involvement of businesses are majority female-owned or have a large number of females as part of their workforce.

Engaging with the owners of the identified SMEs and assessing any need for support to enable them becoming a supplier to the EPC Contractor. This support could be technical advice to improve their quality assurance/quality control measures, or other type of support

C.13. The use of an installation workforce from the generation or continuation of employment, and the provision of training opportunities, leading to a sustained or increase in household income.

NOTE: This impact covers the positive changes arising from the generation of local employment opportunities. C14 covers the negative aspects associated with potential frustration towards the project developer and regional government, due to the lack of large-scale employment opportunities.

The construction workforce will mainly comprise 450 people (350 unskilled workers and 100 skilled workers). Unskilled workers will be recruited by the EPC contractor from the local community. These workers will benefit directly from the wages and training opportunities offered to them. Mandatory training will be provided for all workers in health, safety and environmental

(HSE) risk management.

The project offers workers the opportunity to improve their skills through mandatory HSE training. Once the construction work is completed, workers may be able to seek other employment in the construction sector in the future, having been trained and been able to put their experience to good use on this project.

The characteristics of the impact on workers of the construction of employment and training opportunities are assessed below.

Project Stage	Construction	Operation			
	The impact will occur during the construction stage of the Project where workers will be employed by the EPC Contractor. The employed individuals include mostly workers directly employed by the EPC Contractor and additional people employed on a temporary basis from the local community.				
Impact Nature	Positive	Negative			
	The impact is positive because the employment of workers will either generate a new source of income or, where the worker is already employed, continue their employment.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	<p>The impact is direct because the individuals and their household members will benefit from the sustained/increased income which can be spent on improving living standards, food security, the education of children, paying off debts, and other types of spend. A local source of household income may also reduce the need for adult males of households to migrate to other parts of the country and spend time with their family at home, which is common in Tunisia due to scarce formal employment opportunities.</p> <p>The impact is irreversible as whilst the income generated from local employment will cease at the end of their employment, the regular income has the potential to generate substantial benefits to all members of household.</p>				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact is temporary to short-term, as EPC's workforce will be employed for the entire construction stage, whilst locally employed workers may only receive employment for a few months.				
Impact Extent	Local	Regional	National	International	
	The impact of the new employment generated will occur at a local only.				
Impact Magnitude	Negligible	Low	Medium	High	
	The magnitude of the impact is low because the total project workforce is a very small percentage of the working age delegation population.				
Receptor Sensitivity	Negligible	Low	Medium	High	
	Receptor sensitivity is High given the currently unfavourable socio-economic context. Most locally employed workers may currently rely on land-based livelihoods for their household income and food security. Employment for even a limited period (i.e. few months) of time has the potential to reduce their socio-economic vulnerability to external changes that can impact their livelihood, such as drought, agricultural pests, and livestock disease.				
Gender and vulnerability Considerations	Yes	No			
	There is a risk that almost all employment positions generated are allocated to males, reinforcing gender dynamics within the region, community, and in households. The dominance of men in the workforce could result in the income being spent in unsustainable ways rather than focusing on enhancing living conditions at a household level. There may also be an increase in GBVH within households if women attempt to influence how employment income is spent in the household.				
Impact Significance	Negligible	Minor	Moderate	Major	
	Moderate – as the continuation of employment will benefit the household and reduce their socio-economic vulnerability				
Opportunities	Develop a Local Recruitment Plan that preferentially provides opportunities to local people who are women and/or are vulnerable, to avoid just men directly benefiting from the temporary employment positions generated. Include in the Plan specific targets so that employment data and success of implementation can be monitored over time. Include in the Local Recruitment Plan, a commitment to provide financial literacy training to locally employed persons to encourage them to use their new source of household income in a positive and sustainable way. Provide GBVH training to the workforce to reduce adverse impacts to women amongst employed households (this is covered elsewhere in the assessment of construction impacts).				

Local recruitment plan will be developed by the EPC contractor.

C.14. The generation of a limited number of local employment opportunities, leading to intra- and inter- community tensions arising from high expectations of the number of local employment opportunities.

Although local employment has several positive impacts as described above, the EPC contractor will create only a temporary unskilled job, estimated at 450 people (350 unskilled workers and 100 skilled workers) throughout the construction phase.

The characteristics of this impact resulting from tensions due to competition between local populations for employment opportunities are assessed below.

Project Stage	Construction		Operation		
	The impact will occur during the construction stage of the Project where workers are temporarily employed by the EPC Contractor.				
Impact Nature	Positive		Negative		
	The impact is negative because competition between workers can lead to increased tensions within the Menzel Habib delegation and damage to the reputation of the developer and the IFC/EBRD.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is direct because it concerns the potential frustration of individuals and their households. The impact is irreversible because any damage to reputation resulting from the way in which the developer's EPC contractor conducts its local recruitment activities may be long-lasting. It is unlikely that these negative perceptions will lead to conflict, although complaints may be lodged with the Menzel Habib delegate or the governor of Gabes regarding the process used to select local people for the few temporary jobs available.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	Local people will be employed on a temporary or short-term basis. The duration of the impact will continue in the short-term during construction, when there is a strong attention on the process used to recruit local people.				
Impact Extent	Local	Regional	National	International	
	The impact is expected to occur at a local level only where workers from communities are recruited from.				
Impact Magnitude	Negligible	Low	Medium	High	
	Impact magnitude is medium as there are likely to be several people who are seeking temporary employment opportunities, even if the actual number available is relatively low, and local employment opportunities were consistently mentioned by all stakeholders engaged with.				
Receptor Sensitivity	Negligible	Low	Medium	High	
	Receptor sensitivity is low.				
Gender and vulnerability Considerations	Yes		No		
	There is a risk that tensions between men and women occur during discussions within communities and households concerning the local employment positions that are available. Adult males may exert their dominance in society to insist that they seek a position, rather than their female spouses. Some men may also question why the EPC Contractor is seeking to solicit employment interest from women when construction work is predominately undertaken by males.				
Impact Significance	Negligible	Minor	Moderate	Major	
	As the decision as to 'who' is offered a temporary position (and therefore 'who is not' provided with such an opportunity) could result in protests and frustration towards the Project				
Opportunities	None.				

Local recruitment plan will be developed by the EPC contractor.

C.15. The road transport of materials and personnel using the public road network, use of construction machinery, and the presence of excavations, leading to health impacts to pedestrians and other road users, and local people.

The use of the EPC Contractor's vehicles on the public road network will generate risks to the health and safety of other road users and pedestrians. If an incident occurs, this could lead to an injury/fatality and/or economic loss to the owner from a vehicle or other type of asset which becomes damaged.

The national road network used to transport machinery, equipment, and the workforce includes the RN15, followed by a 4 km unclassified road (tarmac track off the RN15). Therefore, no new access roads will be built for the PV site present a high risk.

According to a UK-based charity ‘Brake’⁵, fatigue is a major cause of road accidents worldwide, responsible for 10-20% of all crashes. It shall therefore be important to check the quality of the road vehicles as well as the way in which drivers are managed, to reduce road safety risks to as low as reasonably practicable. Local stakeholders emphasised the poor quality of local roads and potentially significant community safety risks from project-related road movements.

The presence of the construction workforce, excavations, and use of construction machinery generates risks to the health and safety of the public and, depending upon the nature of any incident, could result in economic losses to the owners of any impacted livestock.

The characteristics of impact are assessed below.

Project Stage	Construction		Operation		
	The impact concerns the construction phase, when the EPC contractor transports machinery, equipment and labor to/from the project site, and when machinery is used, and excavations are present.				
Impact Nature	Positive		Negative		
	The impact is negative as a road traffic incident or a person being impacted by contact with a construction machine, or falling into an excavation, could result in an injury/fatality and/or damage to an asset.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is direct because it involves a potential impact to a member of the public or owner of an asset. The impact is either reversible or irreversible depending upon the type of injury or incident that occurs.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact could be temporary, short-term, medium-term, long-term, or permanent depending upon the nature of the incident. For example, a minor injury could take a few months to heal whilst a serious injury requires a longer recovery time. Damage to an asset (such as death of a livestock) will have a duration that will continue until adequate compensation is paid.				
Impact Extent	Local		Regional		National
	The impact will occur at the local and regional levels in governorates where the EPC contractor uses vehicles on the public road network.				
Impact Magnitude	Negligible	Low	Medium	High	
	Impact magnitude is Medium as there will be regular road movements along the sections of the public network used.				
Gender and vulnerability Considerations	Yes		No		
	There are gender and vulnerability considerations to the impact. Children typically have a poorer understanding of road safety risks compared to adults. Vulnerable road users, such as cyclists and pedestrians, are particularly at risk from a road vehicle as they are not protected inside a metal structure. Children are naturally inquisitive and often take high risks, such as risks arising from being near where the excavations are present or where construction machinery is in use. Women and vulnerable people could be targeted by the workforce and be subjected to harassment.				
Receptor Value / Sensitivity	Negligible	Low	Medium	High	
	The sensitivity is high as the safety of the public is of paramount importance.				
Impact Significance	Negligible	Minor	Moderate	Major	
	As Tunisia has a poor road safety record and adjacent land users may not be familiar with frequent large truck movements taking place along local roads.				
Opportunities	There is an opportunity to use the Project’s generation of community health and safety impacts from road movements to raise awareness amongst local school children, about general road safety measures and the risk of approaching construction sites (PV Site and the project’s pylon locations). A public advertisement campaign could also be implemented to remind road users of the rules of the road, and the mandatory adherence to national speed limits and the wearing of seatbelts.				

⁵ Brake the Road Safety Charity. Driver Fatigue. Available at: <https://www.brake.org.uk/>.

- Traffic and Transport Management Plan will be developed by the EPC contractor and will include the following:
 - The outcome of a detailed planning study to identify the section of any road closures or use of newly created sections of road that are required for the installation of the PV plant and pylons.
 - A series of road layout diagrams will be prepared to indicate where temporary changes in access, signage, signals, and pedestrian walkways will occur, and for how long (as required). These road layout diagrams will subsequently be discussed with the relevant government agency to ensure that they are satisfied with the plans and any changes needed shall be made.
 - Using the updated layouts, a series of temporary access routes, signs and signals will be identified and installed, so that road users and pedestrians clearly understand where to go to move around the construction works safely.
 - Details of the Community Grievance mechanism shall be installed at various public places along with supporting maps of temporary deviations, so that people can raise a concern or complaint about these, should they wish to do so.
 - Construction vehicles shall not be overloaded. Speed limits will be obeyed at all times. Seat belts must be worn by all passengers. Drivers shall not be permitted to make phone calls whilst driving.
 - The movement of construction vehicles transporting materials and personnel shall be carefully planned to avoid creating congestion at the entry of construction sites, storage areas, and worker camps. One-way circulation shall be used on construction sites where practicable. Loading, unloading and reversing of vehicles shall be under the control of a competent signaller (also known as a ‘banksman’)
 - All vehicles and plant used shall be inspected on a weekly basis for their general condition, safety-critical features (lights, horn, brakes, windscreen, mirrors, tyres, etc.). Any vehicles found to be defective will not be used until they are repaired.
 - Internal training, awareness raising activities, monitoring using KPIs, and roles and responsibilities.
 - Visible signage indicating “Archaeological Site – No Entry” will be installed around the perimeter to restrict access and prevent any potential damage to the site. Truck circulation areas will be clearly delineated, and specific transport routes will be established for trucks and heavy machinery to ensure they completely avoid the archaeological site.
- An INP representative will be notified prior to the start of construction and will be involved in the demarcation of the archaeological area using a ribbon fence (minimum a buffer of 200 m). The site will be clearly marked and can remain accessible to local communities and visitors.
- As a precaution, the archaeological site located approximately 2.25 km north of the project area must not be considered for the installation of any type of work or transition areas that may be required for handling operations, or for the movement of machinery, materials, and construction equipment.
- Access to the solar PV plant site will be exclusively via the track along the western side, which serves as the primary route for vehicles and equipment and avoids the archaeological site
- All workers on site must be informed about the sensitivity of the archaeological site.

C.16. The occupational health and safety risks to the workforce leading to injuries or fatalities.

The workforce mobilized for the construction of the solar PV plant and the TL will be exposed to several specific sources of risk and impact throughout the work, including :

- Trenching and Excavation: Working in trenches and excavations is dangerous for both workers inside them and workers on the surface of a construction site;
- Falls from height or electric shocks associated with the use of high-voltage electrical equipment, particularly during tower erection and the installation of solar PV plant components.
- Noise generation, particularly during excavation work for structural foundations, of pylons.
- Injuries caused by contact with moving machinery, rotating equipment or site vehicles.
- Falls into excavations, slips or trips, or incorrect use of hand tools.
- The risk of being bitten by venomous animals such as snakes or scorpions present on site, particularly in rural or desert areas.
- There is a risk of heat stress affecting workers' health when they undertake strenuous physical activity in high ambient temperatures. This risk is most likely to occur during the summer months (July and August).
- Weather conditions: heavy rain (1 mm for at least one hour or 10 mm cumulative daily), wind (60 km/h), temperatures: below -2°C, extreme temperatures and fog.

In Tunisia, occupational health and safety performance in the construction sector is generally poor.

The characteristic of this impact is assessed below:

Project Stage	Construction		Operation		
	The impact is relevant to the construction stage when the workforce will be present and exposed to the occupational health and safety risks.				
Impact Nature	Positive		Negative		
	The impact is negative as poor occupational safety could result in a serious injury or fatality, mental distress and anxiety, protests and worker stoppages leading. The provision of poor-quality accommodation could result in water-borne disease and impacts to mental wellbeing.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is direct because it affects the health and wellbeing of individual workers and their households who rely on the health of adults to generate income into their home. Depending upon the consequences, the impact could be reversible or irreversible. For example, mental stress and anxiety can ease over time, whilst a serious injury could have long-term health and economic consequences from an inability to be economically active in the future.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact is temporary as construction works are expected to continue for a period of a few months. However, long-term or even permanent impacts could occur from a serious incident or fatality.				
Impact Extent	Local	Regional	National	International	
	The impact will occur at a local level where workers are present				
Impact Magnitude	Negligible	Low	Medium	High	
	Impact magnitude is medium as the entire workforce will potentially be exposed to these sources of occupational safety risks.				
Gender and vulnerability Considerations	Yes		No		
	Women and/or vulnerable people may be less familiar with general construction work safety risks, compared to male and non-vulnerable workers, as their literacy and education level may be low.				
Receptor Value / Sensitivity	Negligible	Low	Medium	High	
	Receptor sensitivity is high as the safety and wellbeing of the workforce is the highest priority during the construction stage				
Impact Significance	Negligible	Minor	Moderate	Major	
	Major – as mistakes made could have fatal consequences.				
Opportunities	Provide training to the workforce on general management of health and safety risks in the construction sector which could benefit them in other roles that they have, once the works for this Project are complete. Enhance the understanding of the owners of worker accommodation, of relevant health and fire safety risks by sharing the outcome of accommodation audits, so that sources of risk can be reduced, benefitting their business and the safety of all guests.				

The following management plan will be developed by the EPC contractor:

- Occupational Health and Safety Management Plan
 - The outcome of a risk assessment shall be used as the basis for the development of the Occupational Health and Safety Management Plan.
 - A Risk Register shall describe potential risks, likelihood and consequence, significant rating, control measures to be applied, residual risk level, and monitoring measures to ensure that the controls being implemented are effective.
 - The ‘Golden Rules’ which apply to all construction activities covering several topics such as walking under suspended loads, use of PPE, electrical isolation and lockout, working near excavations, checking for the presence of underground utilities before starting excavations, fall protection whilst working from height, use of seat belts in vehicles, use of cell phones whilst driving, no alcohol or drugs, and designated smoking areas.
 - Description of activities that require a Permit to Work and a Permit to Work procedure.
 - A check on the predicted meteorological conditions to provide an early-warning system concerning the risk of heat stress, sandstorms, and flooding if workers are present inside a wadi or other type of drainage feature.
 - Details concerning the potential presence of scorpions and snakes, and the measures required to reduce the risk of with them.
 - Details of a fitness to work certification programme where all workers (local and non-local) must undergo a check to ensure that they are free of communicable diseases.
 - Details of how senior managers will provide leadership to the workforce through their personal involvement in safety briefings, award ceremonies, and similar activities.
 - The use of tool-box talks, preparation of method statements, and task-based risk assessments where necessary.
 - Ensuring that competent personnel only are used for specific roles such as the supervision of complex tasks (such as commissioning electrical equipment), or the use of construction machinery.
 - The distribution and training to workers on the use of PPE which shall be provided free of charge.
 - The provision of occupational insurance so that workers are provided with compensation should an injury/fatality occur.
 - A programme of future audits and inspections to monitor and record the occupational health and safety performance of contractors over time.
 - Internal training, awareness raising activities, monitoring using KPIs, and roles and responsibilities.
- Venomous snakes and scorpions management Plan (Including measures to minimize the risk of snake bites or scorpion stings):
 - Train workers regarding snake/scorpion risks, preventive measures when working on the field, behaviour in case of snake/scorpion encounter, behaviour if victim or witness of a snake bite / scorpion sting (at induction during construction, annually during operation).
 - Allow access to the site only to personnel / workers with ankle-high shoes or boots.
 - Do not allow personnel / workers working alone inside the PV land plot.
 - Provide antivenom on site and annually check the closest medical centres with available antivenom
 - Establish a safe procedure for the capture and removal of snakes, scorpions
 - Annually check with a specialized doctor the snake bite / scorpion sting management procedures and improve them if needed
- Emergency Response Plan
 - An assessment will be conducted to identify a range of realistic emergency scenarios that could occur during construction. This will include a description of the event, their level of severity, potential impacts on environmental and social receptors (biodiversity, water quality, worker

- health, public safety, etc.), and any other relevant information. Using the outcome of this assessment the Emergency Response Plan will be designed to respond to the scenarios identified.
- Emergency response flow charts will be prepared for each emergency scenario including a step-by-step process flow chart that indicates the actions to be undertaken, and who is responsible for each one.
 - Details of an internal Emergency Response Team within the Developer who come together to jointly lead the emergency response effort from the Developer with the assistance of government departments.
 - Communication protocols to notify Developer personnel (including the Emergency Response Team), relevant government departments, and community leaders. This will include a list of up-to-date contact names and telephone numbers.
 - Details of government emergency response resources and the type of support that they could provide during a response covering fire and rescue, police, and medical support.
 - Details of the EPC contractor’s minimum emergency response resources such as on-site spill kits, first aid stations, and other equipment.
 - Subsequent incident investigation activities which will include a root cause analysis and corrective action plan processes.
 - Emergency response drill plan (including frequency of training, desktop drills and ‘live’ drills) to test the Emergency Response Plan.
 - Internal training, awareness raising activities, monitoring using KPIs, and roles and responsibilities.
 - *NOTE: A draft copy of the Emergency Response Plan shall be shared with government authorities who have responsibility for emergency planning and response, to gather their feedback and clarify the notification and reporting arrangements. During these engagements the type and extent of resources that they could provide during an emergency response will be agreed on and recorded. A record of how the engagement has helped define the content of the updated Emergency Response Plan shall be prepared.*

C.17. The use of security personnel to guard equipment and other areas leading to a reduction in the wellbeing of local residents.

A private security company is not likely to be used to guard the storage of equipment and machinery, instead local people from nearby communities will be temporarily hired to perform this role. Even if a private security company is used rather than local residents, none of the personnel acting as guards will be armed.

The use of security personnel introduces a risk that they shall use excessive force against persons attempting to interfere or steal equipment and storage areas, leading to mental stress, injury or, in the worst-case, a fatality.

The characteristics of impacts to local people from the inappropriate behaviour of security personnel are assessed below.

Project Stage	Construction		Operation		
	Impacts from the use of force by security personnel could occur during the construction stage when there is a risk of unauthorised entry, for theft or other reason.				
Impact Nature	Positive		Negative		
	The impact is negative as the inappropriate behaviour by security personnel could lead to an impact to a person’s mental and physical health.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is direct because it concerns the interaction between security personnel and the persons concerned. The impact is either reversible or irreversible, depending upon the seriousness of any incident that occurs.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent

	The duration of the impact depends upon the consequences of the incident that occurs, although it is likely to only be temporary in nature as the personnel will not be armed, and a fatality of a local community resident is very unlikely indeed to occur.			
Impact Extent	Local	Regional	National	
	The impact will occur at a local a level where the solar PV site, TL, and camp is located			
Impact Magnitude	Negligible	Low	Medium	High
	The magnitude of the impact is low as few security personnel (less than 10) are expected to be used at any time, and the guards used may (if they are local residents) be familiar to a person approaching them whilst they are on duty.			
Gender and vulnerability Considerations	Yes	No		
	It is possible that women and children may be particularly at risk from inappropriate behaviour of security personnel, as they may be perceived to be easier to manipulate and have 'less of a voice' to raise a complaint when compared to adult male.			
Receptor Value / Sensitivity	Negligible	Low	Medium	High
	The sensitivity is high as the safety and wellbeing of local people and communities is of paramount importance.			
Impact Significance	Negligible	Minor	Moderate	Major
	The potential impact significance is minor.			
Opportunities	There is an opportunity to provide training to the security personnel used which may assist them in finding future work in this area, once their involvement in this Project is complete.			

The following management plans will be developed by the EPC contractor:

- Security Management Plan (if required)
 - A summary of national and PS4/ESR4 requirements associated with the controls on security personnel, including their ability to be equipped with arms, the use of force, and mandatory screening and training requirements.
 - A risk assessment associated with the use of privately contracted security personnel to identify the types of incidents that could occur, how they may be triggered, how security personnel could respond to such provocation, and a link to the management measures described in the Plan.
 - A risk assessment associated with the involvement of government-provided security personnel who may be asked to provide support during an incident. Details of how the Developer will seek to ensure the responsible behaviour of government-provided security personnel shall be included.
 - Details of a screening procedure to ensure that all security personnel involved have not been implicated in past human rights abuses.
 - Verification of training undertaken by subcontracted security provider(s) to their personnel, covering the use of force and general behaviour.
 - The use of a Security Personnel Code of Conduct which all personnel will be trained on and asked to sign, indicating that they are committed to responsible behaviour and the reasonable use of force.
 - Training of security personnel so that they are aware of the Community Grievance Mechanism.
 - Details of uniform to be used so that security personnel can be easily identified.
 - Details of communications equipment to be provided so that personnel can request support following a security incident.
 - Details of the Worker Grievance Mechanism that can be used to raise a complaint about their working terms and conditions.
 - Internal training, awareness raising activities, monitoring using KPIs, and roles and responsibilities.
- Worker Code of Conduct and Security Personnel Code of Conduct

A requirement for all workers to:

 - Prioritise the safety of themselves and other people in the workplace.
 - Exercise their right to 'Stop Work' if they see an unsafe act in progress.
 - Look after the Personal Protective Equipment (PPE) which is issued to them and ensure that it is correctly used when necessary to do so.
 - Report any incident, near-miss, or other issue of concern to their immediate supervisor as quickly as possible.

- Not consume any illegal substances such as alcohol or illegal drugs, comply with the random alcohol testing programme that shall be in place, and to ensure that all prescribed medication taken in the workplace is approved in advance in writing by a Site Medical Officer.
- Never behave in a way that could be considered by others as being offensive, disrespectful, bullying, or harass another member of the workforce, or a member of the public.
- Never allow race, colour, religion, gender, age, national origin, sexual orientation, gender identity, marital status, disability, or any other characteristic to influence their judgement when it comes to their attitude or behaviour towards others in the workplace, including colleagues, suppliers or members of the public.
- To be informed of the importance that the workplace is suitable for the presence of women, and that GBVH is prohibited in the workplace.
- Never distribute or display offensive material, including inappropriate pictures, cartoons, and symbols of hatred.
- Inform your immediate supervisor if a member of the public or other person (such as a worker in a supply chain company) approaches you to raise a grievance.

A requirement for all security personnel (in addition to the above) to:

- Wear uniform always so that they can clearly be identified as a security personnel and display their unique identification badge clearly.
 - Be friendly when greeting all visitors, undertaking duties in a professional manner.
 - Never abuse their position of authority.
 - Only use force is absolutely necessary and in proportion to the scale and magnitude of the threat.
 - Never carry or use an item which could be considered threatening, including firearms, unless it is absolutely necessary to do so and use only in reasonable and proportionate measures.
 - Report all security incidents to their immediate supervisor without delay.
 - Cooperate with government-provided security personnel at all times.
 - Internal training, awareness raising activities, monitoring using KPIs, and roles and responsibilities.
- Worker grievance mechanism

C.18. The restriction to access land inside the solar PV plant from installation of the perimeter fence

Fencing around the solar PV plant will restrict access to land within the project footprint, even if the access routes remain open. The installation of the fences will prohibit the herder from access to vegetation inside the solar PV plant. Based upon the information available, the land of the solar PV plant and the TL (200 m) is under private ownership and covers an area of 200 hectares of which only 175 hectares will be used for the solar PV project. The land is being leased to one landowner under a *willing lessee, willing lessor* arrangement and no expropriation is required.

The undeveloped land is currently used for herding activities by the landowner for his own livestock. The activities are carried out by his employees. Additionally, consultations with the landowner confirmed that no informal grazing activities are being conducted.

. Furthermore, the solar PV plant site does not contain any significant or key habitats for grazing that differ from the surrounding areas.

Project Stage	Construction		Operation		
	The restriction will begin with the construction of the perimeter fence and will persist throughout the operational phase of the project.				
Impact Nature	Positive		Negative		
	The impact is negative as the impact to the herder employed by the landowner will be unable to access land inside the Project area.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is direct and reversible as grazing is generally carried out on open land				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent

Impact Extent	Long-term whilst the permitter fence is in place.			
	Local	Regional	National	
Impact Magnitude	Local as the impact will change land access conditions within the site.			
	Negligible	Low	Medium	High
Gender and vulnerability Considerations	Negligible the herder will not be impacted as he is employed by the landowner .			
	Yes	No		
Receptor Value / Sensitivity	Negligible	Low	Medium	High
	Negligible as the herder employed by the landowner stated during the engagement that there are alternative areas of land that can be used.			
Impact Significance	Negligible	Minor	Moderate	Major
	Negligible as the change in access will not lead to a loss of livelihood.			
Opportunities	NA			

The following mitigation measure will be developed by the Developer:

- Assess the possibility of maintaining the existing agricultural tracks and adapting the layout of the PV panels accordingly. If this is not feasible, a new track will be provided to ensure continued access to the southern part of the PV site. This will allow local users and adjacent landowners to retain access, while also supporting ongoing grazing activities.

C.19. The construction of the solar PV plant, installation of TL, and use of temporary access roads, leading to disturbance and damage of subsurface archaeological remains where present

According to site investigations (carried out by an archaeology expert in May 2023), no traces of ancient or pre-protolithic ruins have been identified. The few pottery shards, fragments and flint objects discovered are isolated, as they were probably moved by flooding or water flowing through the site. These items are therefore considered to be out of archaeological context. However, site preparation and earthworks could reveal chance finds of underground remains dating back to prehistoric or historical periods. It should also be noted that there is an important archaeological site located approximately 2.25 km north of the project area, specifically at the entrance to the north-south track that serves the solar PV plant. During the consultation organized as part of the due diligence phase on August 27, 2025, the INP emphasized that all archaeological sites, regardless of their apparent value, should be considered important. This approach therefore requires particular vigilance during the construction phase, especially when using machinery, in order to avoid any potential impact. On the same day, the representative of the local community of El Mehmla was consulted and confirmed that this site is indeed frequented by local residents, thus highlighting its current cultural and social importance moreover, it's important de mention that access to the solar PV plant site will be exclusively via the track along the western side, which serves as the primary route for vehicles and equipment and avoids the archaeological site

The characteristics of impacts to cultural heritage receptors from construction works are assessed in the below table.

Project stage	Construction		Operation		
	The impact is relevant to the construction stage when the workforce is present.				
Impact Nature	Positive		Negative		
	The impact is negative as the installation of excavations, use of machinery and vehicles on land could impact archaeological resources below ground.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is direct if the physical integrity of a cultural heritage resource is impacted within the area disturbed. The impact is irreversible as once the remains are damaged then they lose their value				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	Damage to an archaeological artifact could be permanent				
Impact Extent	Local	Regional	National	International	
	The impact will be felt at the local levels, as the project covers El Mehemla sector.				
Impact Magnitude	Negligible	Low	Medium	High	
	Medium as whilst no in-situ archaeological remains were identified within the Project site and along the route of the TL.				
Gender and vulnerability Considerations	Yes		No		
	None identified.				
Receptor Value / Sensitivity	Negligible	Low	Medium	High	
	Receptor sensitivity is medium, protected cultural heritage have been identified in the project area (at 2.25 km).				
Impact Significance	Negligible	Minor	Moderate	Major	
	Moderate.				
Opportunities	There are no opportunities associated with this impact.				

The following management plan will be developed by the EPC contractor:

- As a precaution, the archaeological site located approximately 2.25 km north of the project area must not be considered for the installation of any type of work or transition areas that may be required for handling operations, or for the movement of machinery, materials, and construction equipment.
- Access to the solar PV plant site will be exclusively via the track along the western side, which serves as the primary route for vehicles and equipment and avoids the archaeological site
- All workers on site must be informed about the sensitivity of the archaeological site.
- An INP representative will be notified prior to the start of construction and will be involved in the demarcation of the archaeological area using a ribbon fence (minimum a buffer of 200 m). The site will be clearly marked and can remain accessible to local communities and visitors.
 - As a precaution, the archaeological site located approximately 2.25 km north of the project area must not be considered for the installation of any type of work or transition areas that may be required for handling operations, or for the movement of machinery, materials, and construction equipment.
 - Access to the solar PV plant site will be exclusively via the track along the western side, which serves as the primary route for vehicles and equipment and avoids the archaeological site
 - All workers on site must be informed about the sensitivity of the archaeological site.
- Chance Find Procedure
 - Known cultural heritage sites located within 200 m radius of a pylon or a temporary access road must be marked from the area of land likely to be disturbed, towards the site, to ensure that the workforce does not approach it unless necessary. This minimum 200 m buffer complies with Articles 26 to 48 of the Tunisian Code for the Protection of Archaeological, Historical, and Traditional Arts Heritage, thereby ensuring effective protection of any archaeological finds uncovered during construction

- Where there is a potential risk of encountering archaeological remains, a INP representative or archaeologist must be present during the construction activities.
- If a person discovers a physical cultural resource, such as (but not limited to) archaeological sites, historic sites, relics and artifacts, or a cemetery and/or individual graves during excavation or construction work, the following steps must be taken:
 1. Stop all work in the vicinity of the find, until a solution is found for the preservation of these artifacts, or advice is obtained from the appropriate authorities.
 2. Immediately notify a foreman. The foreman will then inform the construction manager and the Environmental Officer (EO)/Environmental Manager (EM).
 3. Record details in the incident report and take photos of the discovery.
 4. Delineate the site or area discovered; secure the site to prevent damage or loss of removable objects. In the case of removable antiquities or sensitive relics, an overnight guard should be organised until the relevant local authorities take over.
 5. Preliminary assessment of finds by archaeologists. The archaeologist must make a rapid assessment of the site or find to determine its significance. Based on this assessment, the appropriate strategy can be implemented. The significance and importance of finds must be assessed in relation to various cultural heritage criteria, such as the aesthetic, historical, scientific or research, social and economic values of the find.
 6. Sites of minor importance (such as isolated or unclear features and isolated finds) must be recorded immediately by the archaeologist, in order to cause as little disruption as possible to the contractor's work schedule. The results of all archaeological work must be reported to the ministry or agency upon completion.
 7. In the event of a significant discovery, the Agency/Ministry (Agency for the Protection of the National Heritage or Centre for Archaeological Research, hereinafter referred to as the Heritage Team) must be informed immediately and as soon as possible.) must be informed immediately and in writing within 7 days of the discovery (ref. Heritage Protection Act).
 8. The on-site archaeologist provides the Heritage Team with photographs and other information relevant to the identification and assessment of the significance of heritage items.
 9. The department must investigate the matter within 2 weeks of the date of notification and provide a written response.
 10. Decisions on how to deal with the finding must be taken by the responsible authorities. These may include development modifications (as in the case of the discovery of an immovable relic of cultural or archaeological significance), conservation, preservation, restoration and salvage.
 11. Construction work may not resume until authorization has been obtained from the competent authorities.
 12. If no reply is received within the above-mentioned two-week period, this will be deemed to constitute authorization to continue the suspended construction work.
- One of the main requirements of the procedure is record keeping. All findings must be recorded. Photographs, copies of communications with decision-making authorities, conclusions and recommendations, and implementation reports are kept.

Options for handling human remains

- The handling of human remains thought to be of an archaeological nature requires communication following the same procedure as described above.
- There are two possible courses of action:
 1. Avoid. The development project is redesigned in such a way as to completely avoid the remains discovered. It is necessary to assess whether the remains may be affected by residual or cumulative impacts associated with the development, and to respond appropriately with a comprehensive management plan.
- Exhume. Exhumation of remains in a manner deemed appropriate by decision-makers. This involves prior determination of a suitable site for reburial of the remains. Certain ceremonies or

procedures may need to be followed before development activities can resume in the area of discovery

8.1.2 Impacts during the operational phase

This section identifies and assesses the impacts that may be generated on the Project site and surrounding areas during the operational phase. For each impact, a set of mitigation and monitoring measures are identified to avoid and minimise negative impacts, or are designed to maximise positive impacts.

The impacts for the operational phase are assessed using the following topic areas:

(i) Impacts on physical environment

- **Resource efficiency and pollution prevention and control**

- O1. Water requirements
- O2. Solid and liquid waste

(ii) Impacts on biological environment

- **Biodiversity conservation and sustainable management of living natural resources**

- O3. Potential Impact on Flora and Fauna (excluding avifauna)
- O4. Potential impacts on avifauna.

(iii) Impacts on social environment

- **Economy and employment**

- O5. Local and regional economy.
- O6. Improving access to and reliability of electricity through the development of renewable energy production infrastructure
- O7. Potential labor law violations within the supply chain

- **Labor and working conditions**

- O8. The generation of occupational health and safety risks for staff, resulting in injury or death.
- O9. Potential impacts on human health related Electromagnetic Fields (EMF)
- O10. Fire risk

8.1.3 Impacts on physical environment

O1. Water requirements

During the operational phase, approximately 20 people will work at the solar PV plant for maintenance and will consume approximately 120 m³/year.

The PV modules will be cleaned regularly to prevent dust accumulation that could affect their performance. In this case, a dry-cleaning method (no water or cleaning solvent is used) is proposed with a dry rolling brush, which is propelled by a vehicle (tractor) travelling between the rows of modules.

Project Stage	Construction		Operation		
	The impact concerns the operational phase				
Impact Nature	Positive		Negative		
	Even if the quantity is small, it is still the consumption of a natural resource, so it has a negative environmental impact.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	Water use is directly linked to human activities on the site and can be reduced or stopped if necessary.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	Water requirements persist throughout the entire lifetime of the plant.				
Impact Extent	Local		Regional		National
	Water requirements persist throughout the entire lifetime of the plant.				
Impact Magnitude	Negligible	Low	Medium	High	

	120 m ³ /year is a small amount, especially if it is taken from a non-sensitive source.			
Gender and vulnerability Considerations	Yes		No	
	None.			
Receptor Value / Sensitivity	Negligible	Low	Medium	High
	No sensitive aquatic areas or critical aquifers are mentioned. The site appears to be relatively insensitive at this level of consumption.			
Impact Significance	Negligible	Minor	Moderate	Major
	By combining the criteria (low magnitude + low sensitivity), the final impact is minor.			
Opportunities	NA			

Mitigation measures

- Prepare a hydrological study to demonstrate that there is sufficient groundwater available for abstraction and that the usage by the project will not result in significant depletion.
- Coordinate with the relevant authority (CRDA) to determine the most feasible and practical approach to ensure the water requirements of the Project;
- Prepare a water management plan taking into account the implementation of a dry-cleaning method.
- For solar panel cleaning, a waterless solution must be preferred. In the event of periodic use of water, it is recommended that a water balance be prepared to confirm the absence of water use competition with local agricultural or community needs, taking into account climate change.
- Document water consumption during the operational phase (monthly).

O2. Solid and liquid waste

During the operational phase, very small quantities of waste will be generated in the same way as construction waste. In particular, hazardous waste, mainly broken PV modules, will be recycled by an accredited facility in accordance with all applicable environmental laws. It should be noted that renewable energy remains a relatively new sector in Tunisia. Broken or damaged PV panels are usually stored on the PV site and later assessed with the supplier for potential repair or recovery. In the future, unrepaired PV modules may be handled by local recycling companies as the national sector develops. With regard to general municipal waste (such as food, paper, glass, bottles, plastic, etc.), the quantities of solid waste generated are not expected to be significant and will be collected and transported to the nearest controlled and approved landfill site.

The amount of sanitary wastewater during the operational phase is very low. It is estimated at approximately 10m³ /month. This water will be regularly collected by tanker trucks from the project site and transported to the nearest sanitary wastewater treatment plant.

Project Stage	Construction		Operation		
	Waste (hazardous, household, technical) and wastewater are generated only during site operation.				
Impact Nature	Positive		Negative		
	This involves waste emissions, even in small quantities, which have a negative impact on the environment if they are not properly managed.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is directly related to the operation of the site and can be reversed through proper management and regulatory disposal of waste.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	Waste is produced sustainably throughout the entire life cycle of the solar PV plant and the TL.				
Impact Extent	Local		Regional		National
	The impact is limited to the perimeter of the solar PV plant and along the TL and maintenance intervention areas.				

Impact Magnitude	Negligible	Low	Medium	High
	Volumes are low to moderate. Their planned management reduces the potential impact.			
Gender and vulnerability Considerations	Yes	No		
	None.			
Receptor Value / Sensitivity	Negligible	Low	Medium	High
	Waste is collected, sorted, and transported to approved facilities, which limits the sensitivity of receptors (soil, water, populations).			
Impact Significance	Negligible	Minor	Moderate	Major
	Good management keeps the impact to a minimum, although vigilance is required when monitoring hazardous waste.			
Opportunities	NA			

Mitigation measures

The following mitigation measures will be applied:

- Monitor wastewater and solid waste management practices on site to ensure that waste is separated and stored appropriately. Sanitary wastewater will be collected in a sealed tank and transported by tanker truck to the nearest ONAS wastewater treatment plant.
- Review the tracking log/manifest for all types of waste produced;
- Develop and communicate key performance indicators to the EBRD and IFC to monitor waste reduction and waste recycling; and
- Inspect all third-party waste transporters or waste treatment/disposal facilities prior to use.

8.1.3.1 Impacts on the biological environment

O3. Potential Impact on Flora and Fauna (excluding avifauna)

The Solar PV plant is located in an arid climate zone and is part of a larger ecological area characterised by similar fauna and flora habitats. In this context, photovoltaic panels do not generally generate significant constraints on vegetation development. On the contrary, the partial shade provided by PV panels in arid environments can reduce the water and heat stress experienced by plants during the summer season, thereby promoting the maintenance or even restoration of vegetation cover. Modern installations, by allowing diffuse light to penetrate beneath the modules, enable relatively uniform growth of plant species, contributing to a certain diversification of habitats that is beneficial to local biodiversity. This assessment is supported in particular by the work of Ravi et al. (2023), which demonstrate that in arid environments, photovoltaic power plants can mitigate extreme climatic conditions and support vegetation regeneration (*Ravi et al., 2023 – Agronomy, MDPI*). As for wildlife, although photovoltaic infrastructure can lead to partial habitat fragmentation, this risk remains limited because fauna can move to similar habitats. In addition, some species present at the solar PV plant, such as reptiles (lizards, geckos) and small rodents such as gerbils, are likely to benefit from the new conditions created by the presence of solar installations. These developments offer increased availability of shelter, shaded areas and milder microclimates, which are favourable to the survival and activity of these species. These factors may help to mitigate the effects of the extreme climatic conditions typical of arid environments and support local wildlife biodiversity.

Project Stage	Construction	Operation		
	The impact is relevant to the operational phase			
Impact Nature	Positive	Negative		
	Limited disturbance from maintenance activities but shading and microclimate effects of PV panels can support flora and fauna			
Impact Type	Direct	Indirect	Reversible	Irreversible
	Temporary trampling/disturbance possible during maintenance;			

Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	Minor disturbances will be short and episodic.				
Impact Extent	Local	Regional	National	International	
	Confined to the PV solar plant site, TL corridor, and immediate surroundings.				
Impact Magnitude	Negligible	Low	Medium	High	
	Minimal disturbance from operations.				
Receptor Sensitivity	Negligible	Low	Medium	High	
	Flora and fauna include protected species such as <i>Acacia tortilis</i> , <i>Stipa tenacissima</i> and sensitive reptile.				
Gender and vulnerability Considerations	Yes		No		
	NA				
Data gaps and further studies required	NA				
Impact Significance	Negligible	Minor	Moderate	Major	
	Impacts are minor due to low disturbance levels and potential ecological co-benefits.				
Opportunities	Not applicable				

Mitigation measures

- Where possible, consider mechanical weeding twice a year to control vegetation in the interstitial spaces within the solar PV plant.
- Maintain the natural recolonisation of the site to restore these habitats.
- Implement appropriate measures (waste management, prohibition of pesticide use, etc.).
- Train workers and other stakeholders on environmental concerns, in particular poaching and illegal hunting of wildlife.
- Develop a procedure for managing animals found on site.
- The fence should have small openings to allow access for small wildlife.
- Prohibit the destruction by local residents of several species of reptiles (small lizards that climb walls in summer) out of fear and mistrust, even though these animals are harmless.

04. Potential impact on avifauna

The most significant impact of the transmission lines is collisions and electrocution; this type of risk can even compromise the viability of certain populations and lead to their disappearance in certain areas. However, the 200 m connection line, located entirely within the perimeter of the solar PV plant, presents only a low risk to avifauna. Its short length and confined location greatly limit the likelihood of collisions or electrocution. Field surveys in February and August 2025 recorded a bird community dominated by sedentary passerines, with no waterbirds or evidence of migratory movements. Two species of conservation interest were identified: the Southern Grey Shrike (*Lanius meridionalis*), classified as Vulnerable (VU) both globally and nationally, and the Long-legged Buzzard (*Buteo rufinus*), assessed as Near Threatened (NT) at the national level. Potential impacts on these species are considered minor, as the connection line is only 200 m long, located entirely within the PV solar plant perimeter, and does not intersect sensitive habitats or migratory corridors. In addition, the nearest Ramsar site, Sebkhet Sidi Mansour, is located more than 3 km away, and no functional ecological link with the project area has been identified. Furthermore, the surrounding homogeneous steppe landscape provides abundant alternative habitats, any disturbance would be limited to occasional maintenance activities.

Project Stage	Construction	Operation
	The impact is relevant to the operational phase	
Impact Nature	Positive	Negative
	The impact is negative in that it can result in serious harm or death to the receptor(s).	

Impact Type	Direct	Indirect	Reversible	Irreversible
	Direct and irreversible throughout the operational phase.			
Impact Duration	Temporary	Short-term	Medium-term	Long-term
	Long term - throughout the operational phase of the solar PV plant and the TL			
Impact Extent	Local	Regional	National	International
	PV solar plant site, TL corridor, and immediate surroundings.			
Impact Magnitude	Negligible	Low	Medium	High
	Collision risks are not widespread.			
Receptor Sensitivity	Negligible	Low	Medium	High
	Presence of NT (IUCN 2025) and VU/NT (national) bird species. No waterbirds or evidence of migratory movements			
Gender and vulnerability Considerations	Yes		No	
	NA			
Data gaps and further studies required				
Impact Significance	Negligible	Minor	Moderate	Major
Opportunities	Not applicable			

Mitigation measure

- Regular monitoring (at least once a year) of the connection line to detect signs of bird nesting on the pylons. In the event of nesting, anti-perching and nesting devices will be installed to minimise bird visits to these structures. These devices will be replaced if necessary.
- Avifauna Monitoring: Record any avifauna incidents occurring during the first year of operation. For injured birds, document all visible signs of injury and specify the affected body parts. Collect and label any carcasses found, ensuring they are removed from the site for proper handling and recording.

8.1.3.2 Impacts on the social environment

05. Local and regional economy

The project will have a positive influence on the regional and national economy during its operation, due to the direct purchase and supply of materials and services by companies based in the governorate of Gabes. In addition, the project will have significant tax revenues for the governorate of Gabes.

The project is expected to provide employment opportunities for local communities. This could help improve the living conditions of its inhabitants and bring economic and social prosperity to the local community, including women, unemployed young people and vulnerable people.

The project will provide a range of benefits for local communities in the vicinity of the project.

Project Stage	Construction		Operation		
	The impact is relevant to the operational phase				
Impact Nature	Positive		Negative		
	The project generates lasting economic benefits for the region (permanent jobs, tax revenue, services).				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The project generates direct effects such as the creation of sustainable jobs and maintenance of facilities, as well as indirect effects through support services and local tax revenues, while remaining reversible due to the possibility of shutdown at the end of the infrastructure's life cycle.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent

	Long term to permanent – Estimated project duration 25 years of operation, with sustained socioeconomic effects.			
Impact Extent	Local	Regional	National	International
	Local, Regional, and National – Benefits concentrated in the Menzel Habib delegation but with regional (purchases, taxation) and national (clean energy production) spillover effects.			
Impact Magnitude	Negligible	Low	Medium	High
	The project has a significant impact at the local level, particularly in terms of employment, related economic activities, and tax revenues, promoting sustainable socio-economic development. However, this influence is limited in time, as it is potentially reversible at the end of the infrastructure's life cycle, which mitigates its long-term impact.			
Receptor Sensitivity	Negligible	Low	Medium	High
	Local need for stable economic opportunities; expectation of profit redistribution through public services and local employment.			
Gender and vulnerability Considerations	Yes		No	
	The project may exacerbate certain vulnerabilities, particularly among marginalized groups such as women, the elderly, or low-income households, especially in terms of access to employment opportunities, exposure to nuisances, or participation in decision-making processes. An inclusive approach is therefore essential to ensure that the socio-economic benefits of the project are distributed equitably and that risks are mitigated for the most vulnerable populations.			
Data gaps and further studies required	N/A			
Impact Significance	Negligible	Minor	Moderate	Major
	Moderate – as the continuation of employment will benefit the household and reduce their socio-economic vulnerability.			
Opportunities	Creation of skilled and sustainable jobs (technicians, maintenance, management) Strengthening of public services in the governorate of Gabes Potential for developing a service ecosystem around the site (logistics, security, cleaning) Development of local training programs specializing in renewable energy			

Mitigation measures

- Implement a Local Content Policy that seeks to procure goods and services from SMEs based in Gabes to enhance the economic impacts that will result from the development of the Project at the governorate level. This plan should be developed under the supervision of the Developer.
- Implement a Local Employment Plan to work with members of the local community during the operational phase. The plan should aim to support the local community by setting out its goals and objectives and should recognise the importance of establishing a strong socio-economic relationship with the local community through a participatory planning programme. The plan should be developed under the supervision of the Developer.
- Implement a Community Development Plan (CDP).

06. Improving access to and reliability of electricity through the development of renewable energy production infrastructure

The project makes a significant contribution to improving access to electricity and grid reliability in the region. By strengthening local production capacity through a renewable source, it diversifies supply, reduces dependence on fossil fuels, and supports the growing energy needs of neighboring communities. Thanks to integration into the grid via the TL, the electricity produced is transported stably and efficiently to consumption areas, strengthening the resilience of the energy system while contributing to the transition to a more sustainable energy mix.

Project Stage	Construction		Operation	
	The impact is relevant to the operational phase			
Impact Nature	Positive		Negative	
	The impact is positive			
Impact Type	Direct	Indirect	Reversible	Irreversible
	The impact is irreversible as once the infrastructure is constructed it will continue to operate and generate benefits.			

Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The positive impact lasts throughout the PV solar plant's lifetime, with lasting effects for local communities.				
Impact Extent	Local	Regional	National	International	
	The impact will occur at a regional and national level				
Impact Magnitude	Negligible	Low	Medium	High	
	The impact magnitude is medium as the project contributes to diversifying the energy mix and strengthening national production capacity.				
Receptor Sensitivity	Negligible	Low	Medium	High	
	The power rating of the Project will contribute to strengthening the national energy mix.				
Gender and vulnerability Considerations	Yes		No		
	N/A				
Data gaps and further studies required	N/A				
Impact Significance	Negligible	Minor	Moderate	Major	
	Due to its regional scope, sustainability, and social benefits, the impact is classified as major.				
Opportunities	The project creates socio-economic opportunities: employment, industrialization, improved public services, and reduced energy insecurity.				

07. Potential labor law violations within the supply chain

The integration of a supply chain into the project exposes it to potential risks of labor law violations. These risks may include precarious working conditions, the absence of formal employment contracts, inadequate health and safety standards, and serious practices such as child labor, forced labor, or other forms of exploitation.

Project Stage	Construction		Operation		
	In the operation phase				
Impact Nature	Positive		Negative		
	Negative – Risk of non-compliance with labor standards among service providers or subcontractors involved in operations (maintenance, security, cleaning, etc.).				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	This impact, which is indirect in nature as it results from the practices of service providers, remains reversible as it can be avoided or corrected through control, monitoring, and compliance mechanisms put in place by the project developer.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	Long term to permanent – As long as subcontractors are involved in operation and maintenance, the risk persists.				
Impact Extent	Local	Regional	National	International	
	Concerns service providers operating in or near the operating area.				
Impact Magnitude	Negligible	Low	Medium	High	
	Low to medium – Depends on the number of subcontractors and the level of contractual control exercised by the operator.				
Gender and vulnerability Considerations	Yes		No		
	None.				
Receptor Value / Sensitivity	Negligible	Low	Medium	High	
	Vulnerable workers (unskilled, women, young people, informal workers) are most at risk of violations.				
Impact Significance	Negligible	Minor	Moderate	Major	
	Moderate – If no preventive measures are put in place, the risk may materialize and affect the project's reputation and legal compliance.				
Opportunities	Implementation of a supplier code of conduct and social clauses in contracts Regular audits and grievance mechanisms for workers Promotion of international labor standards (ILO) among local service providers				

Mitigation measures

As with the mitigation measures adopted for construction activities, the Operator will implement a supply chain management plan for the PV solar plant. The Developer shall take all necessary precautions and conduct proactive and thorough investigations to ensure the origin and supply chain of equipment, components, materials and other supplies used for the operation of the project so that they are not manufactured and supplied by companies (or subcontractors) that do not comply with the policies and standards of the EBRD and the IFC, which categorically prohibit and ban (i) the employment of children or the abuse of vulnerable persons and (ii) the practice of forced labour, human trafficking and slavery.

08. The generation of occupational health and safety risks for staff, resulting in injury or death

During the operation and maintenance phase of the project, which includes the solar PV plant and the high-voltage power line, the developer does not anticipate any major work except in the event of incidents such as theft, lightning, or any other failure requiring technical intervention. The equipment is designed to operate with a minimal level of intervention in the absence of such events.

If repairs are necessary, the main risks to personnel are related to working at heights, handling live equipment, slips and trips, and using vehicles and mechanical equipment for maintenance. These risks apply to operations of both the power line and the solar PV plant.

An assessment of the potential impact on personnel reveals exposure to low occupational health and safety standards, especially in rural or semi-isolated areas where the project could be located. Therefore, preventive measures and local capacity building should be considered to ensure a safe and fair working environment.

Project Stage	Construction		Operation		
	The impact is relevant to the operational stage when the maintenance workforce may be required to undertake repairs to Project infrastructure.				
Impact Nature	Positive		Negative		
	Poor OHS controls could result in a serious injury or fatality, mental distress and anxiety, protests and worker stoppages leading to delays. Violations could also result in regulatory enforcement action being undertaken against the company by the national government labour regulator. Worker unions in Tunisia are particularly strong and have a high level of political influence.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is direct because it affects the health and wellbeing of individual workers and their households who rely on the health of adults to generate income into their home. Depending upon the nature of the consequences of the incident, the impact could be reversible or irreversible. For example, mental stress and anxiety can ease over time, whilst a serious injury could have long-term health and economic consequences from an inability to be economically active in the future.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The source of the risk will continue throughout the operational stage although the duration of the impact, should an incident occur, depends on the consequences of the incident.				
Impact Extent	Local	Regional	National	International	
	Local (affects Menzel Habib delegation)				
Impact Magnitude	Negligible	Low	Medium	High	
	Impact magnitude is medium as workers across all of the solar PV parks will be exposed to risks.				
Gender and vulnerability Considerations	Yes		No		
	None.				
Receptor Value / Sensitivity	Negligible	Low	Medium	High	
	Medium - The source of the risk will continue throughout the operational stage although the duration of the impact, should an incident occur, depends on the consequences of the incident.				
Impact Significance	Negligible	Minor	Moderate	Major	
	The potential impact significance is Moderate.				
Opportunities	Provide training to the workforce on general OHS risk management for HV equipment maintenance, which will help the developer manage risks during similar maintenance activities on non-project infrastructure.				

Mitigation measures

The Project Operator will prepare a Health and Safety Plan (OHS) for work at the solar PV plant. The objective of the OHS Plan is to ensure the health and safety of all personnel in order to contribute to and maintain the smooth and proper conduct of work on site and to prevent accidents that could injure personnel or damage the property of the Developer and all subcontractors involved.

The OHS Plan for the operational phase must be specific to the project and must take into account national requirements, primarily the local Tunisian workforce. In addition, it must also comply with international standards, in particular, but not limited to, the IFC PS2 standard (labour and working conditions), the EBRD's ESR2 and ESR4, etc., which recognise the importance of avoiding or mitigating adverse effects on the health and safety of workers and require the development of a project-specific Health and Safety Plan in accordance with International Good Practice (IGP).

Emergency preparedness and response

The Project Operator shall prepare and implement an emergency preparedness and response plan for the operational phase of the Project. The objective is to establish a series of organisational, operational and preventive measures in the event of an emergency that are appropriate to the circumstances of such situations and that will ensure the safety of workers and property at the Project site.

The plan shall take into account the following elements:

- The incorporation of an emergency response team that includes at least first aiders and

- firefighters who receive appropriate and certified training;
- Conduct emergency drills in coordination with external emergency response services as necessary (e.g., civil defence, nearest hospital, etc.);
- Detailed identification of emergency procedures to be implemented, including initial actions, alerting emergency contacts, site evacuation, and communication with external emergency services;
- Detailed identification of emergency control measures including, but not limited to, fires, personnel accidents, spills, sandstorms, heatstroke and others;
- Detailed identification of emergency procedures to be implemented, including hazards related to snakes and scorpions, including potential bites or stings, procedures for safe handling, first aid measures, and staff awareness training
- Identification of the location of assembly points on site;
- Identification of emergency signage to be put in place on site;
- Identify roles and responsibilities for implementing the plan, including establishing an emergency committee and assigning roles to an emergency manager.

In addition, it is recommended that training on OHS risks associated with solar PV plants be provided for workers who may not have prior experience in this sector.

09. Potential impacts on human health related Electromagnetic Fields (EMF)

The project generates electromagnetic fields (EMFs) related to the generation and transmission of electricity. Power lines produce electric fields due to voltage and magnetic fields due to current. These fields decrease rapidly with distance, but they can pass through most obstacles, unlike electric fields. The International Commission on Non-Ionizing Radiation Protection (ICNIRP) and IFC guidelines acknowledge certain acute effects on the nervous system. However, long-term pathological effects have not been empirically demonstrated. Nevertheless, this justifies vigilance framed by strict regulatory thresholds. In solar PV plants, the main sources of EMFs are inverters, transformers, cables, and photovoltaic modules. Planned technical measures to reduce their influence include choosing certified equipment, evenly distributing inverters under panel structures, and optimizing cabling. According to the relevant authorities, the levels measured near transformers remain well below regulatory exposure thresholds. Thus, while the health risk is low, rigorously applying standards mitigates concerns about EMF exposure for workers and the general public.

ICNIRP exposure limits for the general public's exposure to electric and magnetic fields

Frequency	Electric Field (V/m)	Magnetic Field (µT)
50 Hz	5,000	100

The characteristics of impacts to community health related to EMF are assessed below.

Project Stage	Construction		Operation		
	The impact is relevant to the operational stage when the TL and the PV Solar Plant will be energised and in use.				
Impact Nature	Positive		Negative		
	The project generates electromagnetic fields (EMFs) during its operational phase.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is direct because it involves a potential impact to community. The impact is reversible as local people concerned about EMF levels can be informed about the risk to their health, so that they do not see this as an area of concern in the future.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	Long term - throughout the operational phase				
Impact Extent	Local		Regional		National
	Local as effects will be limited to areas directly adjacent to the project infrastructure.				
Impact Magnitude	Negligible	Low	Medium	High	

	Negligible – as the TL will be positioned away from any residential structures and sufficiently high above the ground. No impacts to human health are expected to occur.			
Gender and vulnerability Considerations	Yes		No	
	None.			
Receptor Value / Sensitivity	Negligible	Low	Medium	High
	Negligible - no impacts to human health are expected to occur.			
Impact Significance	Negligible	Minor	Moderate	Major
	The potential impact significance is negligible.			
Opportunities	NA			

010. Fire Risk

There is a risk of fire associated with the project's electrical installations, including the solar PV plant and the TL, although this risk remains low for the surrounding population. The solar PV plant is made up of mostly non-combustible materials (such as steel and glass), and the equipment will be selected from among the world's most reputable suppliers. It will also be equipped with appropriate safety devices, in particular to limit the risk of short circuits, overheating, or intrusion. With regard to the high-voltage line, there are risks of windfall, contact with vegetation, or accidental sparks, but these are controlled by the implementation of regulatory rights-of-way, cut-off systems, and periodic monitoring. In the event of deliberate or accidental intrusion by an unauthorized person (despite the presence of barriers, fences, and signage), the risk of injury or burns related to the solar PV plant or power line cannot be completely ruled out, but remains low thanks to the safety standards applied and the distances maintained.

These extreme heat conditions must be carefully considered in the design and operation of the solar PV plant, as they can severely impact the performance and reliability of electronic components. Prolonged exposure to such high temperatures increases the risk of overheating and electrical malfunctions, potentially leading to unpredictable fire outbreaks.

Project Stage	Construction		Operation		
	The impact concerns the operational phase				
Impact Nature	Positive		Negative		
	Risk of fire due to technical failures (overheating, short circuit) or external events (impacts, vegetation, intrusions).				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	Direct (damage to equipment, harm to personnel or third parties) Reversible (possible destruction but recoverable)				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	Temporary – The event is one-off but can have lasting consequences if poorly managed (loss of assets, service interruption).				
Impact Extent	Local	Regional	National		
	Local – Limited to the boundary of the solar PV plant, the TL corridor, and their immediate vicinity.				
Impact Magnitude	Negligible	Low	Medium	High	
	Low to medium – Low probability of occurrence but moderate severity in the event of an incident (especially in dry or wooded environments).				
Gender and vulnerability Considerations	Yes		No		
	None.				
Receptor Value / Sensitivity	Negligible	Low	Medium	High	
	Low to medium – Remote populations, agricultural or natural infrastructure potentially exposed on the outskirts of the site.				
Impact Significance	Negligible	Minor	Moderate	Major	
	Minor to moderate – Technically low risk but requiring rigorous prevention, detection, and rapid response measures.				

Opportunities

NA

Mitigation measures

- Vegetation will be maintained and controlled by manual or mechanical means so as not to represent a significant source of fuel in the event of a fire on the Project site.
- A strip of bare, cleared land will be left around the installations, inside the site, to serve as a firebreak and limit the spread of fire. This firebreak must allow emergency vehicles to circulate and give them access to all areas of the site to manage fire risks.
- Fire-fighting equipment (appropriate fire extinguishers) shall be placed in transformers and operational team vehicles.
- Signage for the installations, their access, their safety measures and the installation of an alarm and electromagnetic emergency shut-off devices will be taken into account during the design and installation of photovoltaic equipment.
- Equipment that is a potential source of fire (inverters, delivery stations, technical rooms) and electrical components will be regularly inspected and maintained in accordance with all regulatory requirements;
- The installations will be protected against the risk of lightning.
- The site will be monitored day and night by a security guard who will detect any anomalies and ensure a rapid response.

8.1.4 Decommissioning phase

After the 25-year operating period, the PV plant will be modernised to continue operating, transferred to STEG or dismantled. In the event of a decision to cease operations for various reasons, the Developer will ensure that the facilities are decommissioning and the site restored to its original condition.

For the PV plant, decommissioning will be carried out as follows:

- decommissioning of support tables, including driven piles
- Removal of technical premises (transformer and delivery station),
- Removal of cable networks, dismantling and removal of cables and sheaths,
- Decommissioning of the perimeter fence.

The impacts expected throughout the dismantling phase are similar to those assessed during the construction phase, namely:

- Impacts on the physical environment.
- Impacts on the biological environment.
- Impacts on the social environment, including risks to the health and safety of the community (risks related to road transport, intrusion on the site and risks to incoming workers).
- Impacts on infrastructure and public services

Before any dismantling activities, it is recommended that a plan for the disposal of the various components of the PV plant be prepared by the entity responsible for this phase. It is recommended that the plan opts first, as far as possible, for the recycling of the various components of the PV plant. If necessary, the plan must, as a last resort, consider the possibility of disposal in existing waste management facilities in Tunisia.

Before any dismantling activity begins, the entity responsible for this phase should prepare a plan for the disposal of the various components of the PV plant. The plan should first opt for the recycling of the various components of the PV plant, as far as possible. If necessary, the plan must consider disposal in existing waste management facilities in Tunisia as a last resort.

It is recommended that Voltage develops and adopts a comprehensive decommissioning plan in advance of handover to STEG (if it is the case). This measure will ensure that environmental and

social requirements associated with the end-of-life phase of the Project are adequately addressed, in line with international good practice and lenders (IFC/EBRD) requirements.

8.2 Impacts expected to occur for the existing 150 kV transmission line Bouchama – Mdhilla (140 km)

8.2.1 Occupational health and safety

The planned work along the existing TL Bouchama – Mdhilla (replacement of insulators and upgrading of the line from 150 kV to 225 kV presents specific risks for workers, mainly related to working at height and the use of lifting equipment. Prior to any work, proper planning and coordination with STEG will ensure the complete de-energization and isolation of the line, eliminating the direct risk of electrocution from live components. Other risks include:

- Falls from height, associated with the use of temporary equipment during connection and insulator replacement work.
- Mechanical risks associated with the use of lifting and handling equipment (forklift trucks, small cranes) required for the transport and installation of components, including the risk of falling objects, crushing or impact.

Impact Nature	Positive		Negative		
	The impact is negative as poor occupational safety could result in a serious injury or fatality, mental distress and anxiety, protests and worker stoppages leading. The provision of poor-quality accommodation could result in water-borne disease and impacts to mental wellbeing.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	The impact is direct because it affects the health and wellbeing of individual workers and their households who rely on the health of adults to generate income into their home. Depending upon the consequences, the impact could be reversible or irreversible. For example, mental stress and anxiety can ease over time, whilst a serious injury could have long-term health and economic consequences from an inability to be economically active in the future.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	The impact is temporary as construction works (1 to 2 months) or are expected to continue for a period of a few months. However, long-term or even permanent impacts could occur from a serious incident or fatality.				
Impact Extent	Local	Regional	National	International	
	The impact will occur at a local and regional level where workers are present.				
Impact Magnitude	Negligible	Low	Medium	High	
	Impact magnitude is medium as the entire workforce will potentially be exposed to these sources of occupational safety risks.				
Gender and vulnerability Considerations	Yes		No		
	Women and/or vulnerable people may be less familiar with general construction work safety risks, compared to male and non-vulnerable workers, as their literacy and education level may be low.				
Receptor Value / Sensitivity	Negligible	Low	Medium	High	
	Receptor sensitivity is Medium as the safety and wellbeing of the workforce is the highest priority during the construction stage.				
Impact Significance	Negligible	Minor	Moderate	Major	
	The potential impact significance is Moderate.				
Opportunities	<p>Provide training to the workforce on general management of health and safety risks in the construction sector which could benefit them in other roles that they have, once the works for this Project are complete.</p> <p>Enhance the understanding of the owners of worker accommodation, of relevant health and fire safety risks by sharing the outcome of accommodation audits, so that sources of risk can be reduced, benefitting their business and the safety of all guests.</p> <p>There is an opportunity to train representatives of the government labour office with techniques to assist them with inspecting labour and working conditions to raise their understanding of the application of ESR2 and PS2 to projects in Tunisia.</p>				

Mitigation measures

- The contractor must submit a Health and Safety Plan specific to the work involved in connecting and reinforcing the existing TL.
- Comply with Law No. 87-31 of 6 July 1987, EBRD Requirements EES2 and EES4, and IFC Performance Standard 2 (PS2).
- Detail a risk register (work at height, lifting equipment), with assessment, prevention measures and follow-up.
- Define strict rules: wearing appropriate PPE, lockout and grounding procedures before intervention, prohibition of working under suspended loads.
- Implement a specific work permit procedure for live-line and work-at-height activities.
- Take local weather conditions into account (wind, extreme heat, rain).
- Require the presence of qualified and trained teams, authorised to carry out electrical work and work at height.
- Provide professional insurance covering workers.
- Conduct regular audits and inspections of HSE practices.
- Establish an emergency plan detailing alert, evacuation and response procedures, validated by local authorities.
- De-energization and isolation procedures should be implemented to ensure that equipment is properly shut down and cannot be restarted until the completion of maintenance or repair work.

8.2.2 *Impact on the social environment*

The planned interventions (in particular the replacement of insulators using aerial platforms) will be carried out using existing access tracks. In the absence of an existing track, the Developer will prepare a HSSE Risk Assessment to identify the optimal access option. Resulting impacts will be managed and compensated in the entry and exit protocol (in place for every pylon).

The interventions along the transmission line will follow the same approach as the routine maintenance works carried out by STEG on a six-monthly basis.

It is recommended to work closely with STEG on the technical planning of interventions, particularly with regard to the use of existing access tracks already used by STEG for its maintenance operations.

8.2.3 *Impact of existing infrastructures within the RoW – existing 150 kV transmission line Bouchamma-Mdhilla*

As part of a proactive approach to identifying potential social impacts, a spatial analysis using satellite imagery was carried out along the entire Bouchamma–Mdhilla TL, four structures were identified and located at less than 14 m from the TL.

Only 4 infrastructures are identified in the RoW.

- X1 (distance 12.8 m) - Mosque temporary occupied.
- X2 (distance 9.93 m) - permanently occupied house
- X3 (less than 1m): abandoned house
- X4 (less than 9 m) Mosque under construction.

These structures are currently located within the legally established RoW. This situation is not in compliance with national regulations and is therefore not considered a direct project impact. However, it constitutes a risk in terms of safety, operational reliability, and potential liabilities. Furthermore, there is a risk that additional structures could be established in the RoW in the future if enforcement measures are not applied.

It is recommended to inform STEG of the presence of structures (2 mosques and 2 dwellings). STEG will assess compliance with safety and minimum distance requirements. The governor must

also be involved in the management of social aspects. If the structures are deemed incompatible with public safety, appropriate measures will be decided in coordination with the local authorities. The Developer will perform an assessment of potential HSE risks related to structures (2 mosques and 2 dwellings), including electrocution and potential pylon collapse.

8.2.4 Impact on avifauna

The existing 150 kV TL of 140 km is a secondary environmental issue compared to the Menzel Habib solar PV plant. This component of the project, which has been in place for 40 years, is well known to sedentary and migratory birdlife. Its ornithological impacts (disturbance or risk of collision) are gradually diminishing over the years as birds adapt to such structures.

An initial visit along the TL was carried out in August, over a period of three days, on 21, 22 and 23 August 2025. A total of 41 bird species were recorded, most of these species are sedentary. Bibliographic analysis and field observations confirm that only large-winged species are directly exposed to the impacts of the TL, particularly through collision or electrocution. The groups most affected are:

- Birds of prey (Lanner Falcon *Falco biarmicus*, Kestrel *Falco tinnunculus*, Long-legged Buzzard *Buteo rufinus*, Short-toed Snake Eagle *Circaetus gallicus*, Little Owl *Athene noctua*);
- Corvids (Common Raven *Corvus corax*);
- Columbidae (Rock Pigeon *Columba livia*, Eurasian Collared Dove *Streptopelia decaocto*);
- As well as large wading birds (*Cursorius cursor*, *Burhinus oedicephalus*).

Mortality monitoring revealed a single case of bird mortality: a Pigeon (*Columba livia*) found near pylon no. 33. The absence of signs of predation suggests electrocution or possibly a parasitic disease. Furthermore, following a meeting with STEG in August 2025, it was confirmed that no incidents involving collision or electrocution had been recorded along the TL.

Regarding potential links with the Sebkheth Sidi Mansour Ramsar site, located approximately 2.3 km away, available observations indicate a very limited capacity to support bird populations, due to the almost permanent drying up of Sebkheth Sidi Mansour. This hydrological factor greatly limits its attractiveness to waterbirds, except in exceptionally rainy years, when a few hundred individuals may temporarily stay there. Thus, interactions between the TL and birds from this Ramsar site are considered low to negligible.

As for the risks associated with collisions, these can only be properly assessed after a detailed study of migration patterns and the existence of local flyways. However, ornithological knowledge of the region crossed by the TL suggests that there are no significant migratory populations and that the existing flyways are mostly scattered.

Impact Nature	Positive		Negative		
	Risks of collision and electrocution for certain species of large-winged birds, although the risk remains limited.				
Impact Type	Direct	Indirect	Reversible	Irreversible	
	Direct impact (collision/electrocution), indirect impact through behavioral disruption (avoidance, adaptation). Reversible impact as birds adapt and mitigation measures can be implemented.				
Impact Duration	Temporary	Short-term	Medium-term	Long-term	Permanent
	Since the TL is permanently in place, the potential impacts are long-lasting, even if they tend to diminish as birds adapt.				
Impact Extent	Local	Regional	National	International	
	Limited to TL (140 km), with no regional or national impact. No significant connection with remote protected areas (Sebkheth Sidi Mansour or Chott El Jérid).				
Impact Magnitude	Negligible	Low	Medium	High	

	Very low mortality rate observed (only one documented case), adaptation observed in most species, but some vulnerable species remain at risk (birds of prey, waders).			
Gender and vulnerability Considerations	Yes		No	
	NA			
Receptor Value / Sensitivity	Negligible	Low	Medium	High
	There are no significant migratory populations and that the existing flyways are mostly scattered			
Impact Significance	Negligible	Minor	Moderate	Major
Opportunities	Installation of anti-perching devices and regular monitoring of bird life - Collection of scientific data on local species - Raising awareness of local biodiversity These actions help reduce impact, improve ecological knowledge of the site, and demonstrate a commitment to environmental protection.			

Mitigation measure

The following identifies the monitoring and reporting requirements:

- **Avifauna Monitoring:** Record any avifauna incidents occurring during the bi-annual inspection of TL by STEG. Collect and label any carcasses found, ensuring they are removed from the site for proper handling and recording.
- Keep work areas clear and limit activity to the strictly necessary right-of-way.
- Carry out work on pylons between October and March, outside the nesting period.

8.3 Assessment of cumulative risks and impacts of the Project

Any future renewable energy project must carefully assess existing or planned projects to determine potential cumulative impacts and whether proposed mitigation measures need to be adjusted in terms of geographical scale, frequency or scope. In addition, it may be necessary to develop new mitigation measures. Stakeholder engagement processes should also be reassessed to ensure they are adequate. It is essential to assess the additional project in relation to the lenders involved, particularly if they differ from those of current or planned projects, such as the EBRD, the World Bank or others.

In addition, the ESIA examined the cumulative impacts that could result from the additional impacts of other existing and/or planned developments in the area.

8.3.1 Railway line (SNCFT)

The solar PV plant is located in an isolated area, far from any industrial activity, which, at this stage, limits the likelihood of significant cumulative environmental impacts. However, the southern part of the site is crossed by a railway line, used to transport phosphate between Gafsa and Gabes.

In accordance with Article 6 of Law No. 98-74 of 19 August 1998 on railways, specific restrictions apply to construction near railway lines. In particular, in areas where the track is on an embankment more than 3 m above the natural ground level, construction is prohibited within a strip of land equal in width to the height of the embankment, measured from the base of the slope.

The SNCFT railway line upgrade project (2026–2028) is expected to increase train capacity from 4 to 5 pairs per day. In parallel, construction of the solar PV plant is scheduled from early 2026 to mid-2027 on 200 hectares of private land. As a result, there is a possibility that the two construction periods may overlap.

Negative impacts, mostly temporary, include noise, dust, vibrations, and disruptions from construction traffic, potentially affecting local communities. The installation of solar panels may alter the landscape, and pressure on local resources (water, labor) requires careful management.

To maximize benefits and minimize impacts, close coordination among Voltaia, STEG, SNCFT, local authorities, and civil society is essential. This includes mitigation measures (dust control, noise reduction), a complaint management mechanism, a stakeholder engagement plan, and rigorous environmental and social monitoring with clear performance indicators.

Worker safety will be ensured through close coordination with SNCFT regarding train schedules and railway operations, the establishment of clearly marked exclusion zones along the embankment to prevent unauthorized access by workers and machinery, and the installation of warning signs adjacent to the railway. Workers will receive specific training on the risks associated with working near railway lines, and continuous supervision will be provided by a designated safety officer to ensure strict compliance with procedures.

8.3.2 *Solar PV Projects under construction and under development*

Based on a review of currently available information, the existing development projects within a 20 km radius of the solar PV plant of Menzel Habib PV site are:

Sidi Bouzid 1 solar PV plant - 60 MW under construction

The Sidi Bouzid 1 solar PV plant (60 MW) is currently under construction and is expected to come online in the fourth quarter of 2025. The Menzel Habib PV site is located approximately 19 km away.

The Sidi Bouzid 1 solar PV plant is located in the Mazzouna delegation, in the governorate of Sidi Bouzid, approximately 8 km from the local community of Khobna. It is also 6 km from Menzel Habib, in the governorate of Gabes. The energy produced is fed into STEG's electricity transmission grid via a 5.2 km long, 225 kV transmission line that has already been built.

Khobna solar PV plant - 198 MW "Qair"

The solar PV plant is located approximately 19.6 km in a straight line from the Menzel Habib PV plant.

Administratively, the proposed site for the 198 MW solar PV plant is located in the Mazzouna delegation, which is part of the governorate of Sidi Bouzid. The 45 km transmission line crosses two delegations: the first section is located in the Mazzouna delegation, while the second section crosses the Meknassi delegation, also located in the governorate of Sidi Bouzid.

The transmission line will follow part of an existing STEG transmission line between Bouchema Meknessi and the final section will follow the second existing STEG line between Bouchema Meknessa.

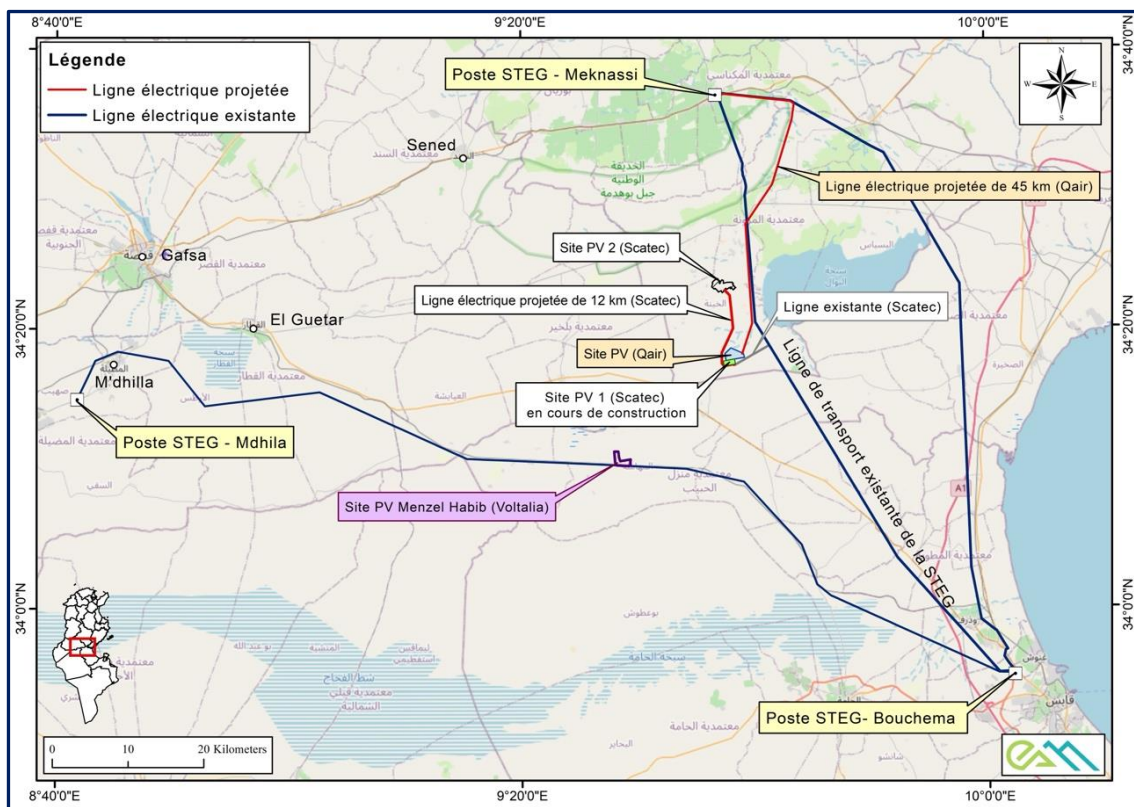


Figure 8.1 - Infrastructure within a 20 km radius of the Menzel Habib PV site

The main cumulative impact identified relates to socio-economic development, particularly employment and supply opportunities for local communities during the construction and operation phases, which would improve the socio-economic conditions of local communities to a certain extent.

It is recommended that, for each project, the EPC contractor develop and implement an employment management plan during the construction phase. This plan should be coordinated between the different projects in order to optimise employment opportunities for the surrounding communities in the respective governorates. Harmonised planning between EPC contractors would help maximise local benefits and avoid duplication or unnecessary competition for local labour. It should be noted that the solar PV plant of Menzel Habib is also expected to attract labour from the local community of Menzel Habib, which could reduce the risk of social tensions between neighbouring communities such as Khobna. Through effective coordination and inclusive planning, employment opportunities could exceed the community's initial expectations and mitigate the risk of inter-community conflicts.

8.3.3 Project to dualling the national roads

The projects involve doubling the capacity of roads organized into two main corridors:

- Corridor 1 (RN15) starts at the Oudhref interchange on the A1 motorway, heads south to the Gabes Nord (Bouchamma) interchange, then follows the RN16 until it intersects with the RN1 (Gabes ring road).
- Corridor 2 (RN16–RN3) begins at the El Hamma ring road and continues toward Gabes, widening existing roads to 2x2 lanes up to the RN1 junction.

The first corridor (RN15) runs near the Menzel Habib delegation, about 12 km from the solar PV plant. This overlap results in significant cumulative impacts. Positively, the projects will enhance accessibility, economic growth, and create employment opportunities for local communities. However, the construction phase may increase environmental disturbances, place strain on local services, and raise the risk of accidents. To address these challenges, coordinated planning among

all stakeholders is recommended to align construction schedules, reduce negative impacts, and maximize local benefits, especially in terms of employment and social cohesion.

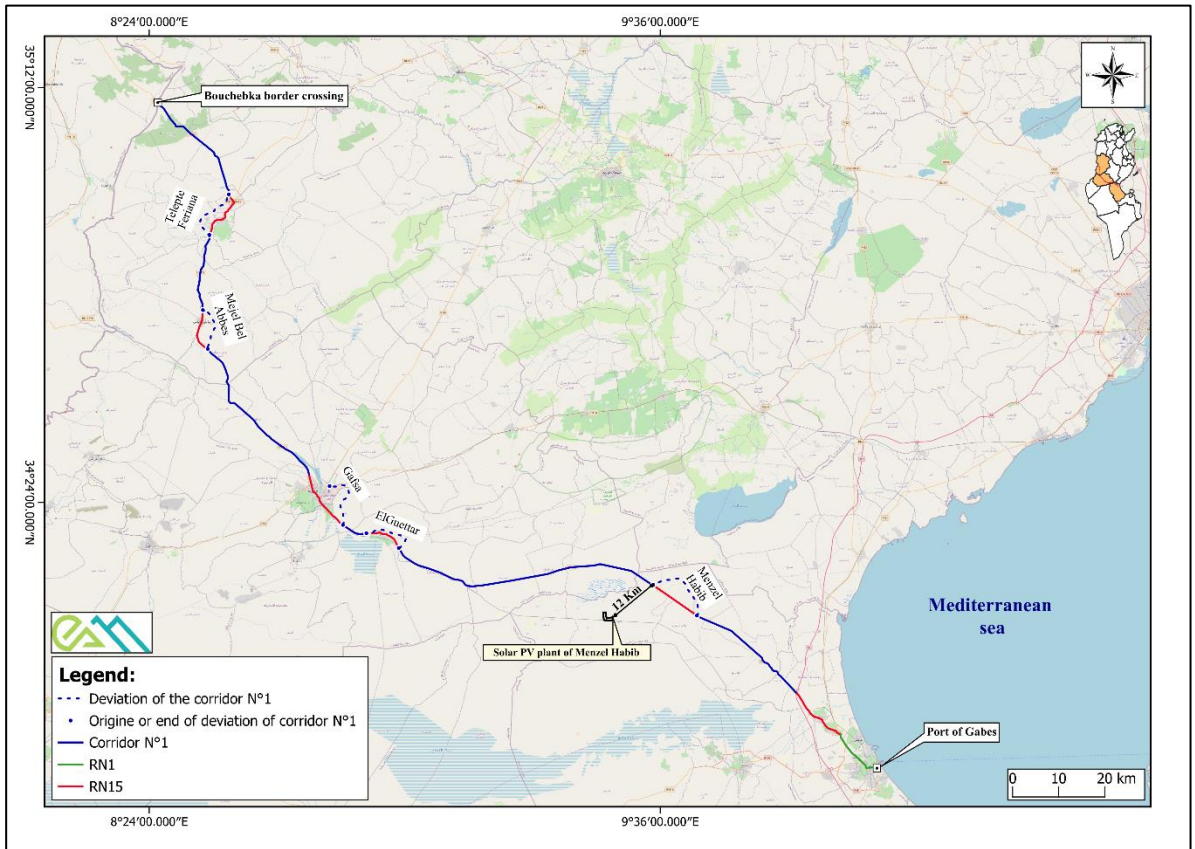


Figure 8.2 - Location of the project for two corridors linking the Bouchebka and Hazoua border posts to the port of Gabes

8.4 Summary of impacts and residual impacts

The purpose of this section is to assess the residual impacts that are expected to occur during construction and operational phases.

Table 8.1 - Assessment of residual impacts during construction phase

Impact title	Initial impact	Management Plan with the control measures	Residual impact
<i>Impact on the physical environment</i>			
C1. The physical presence of the solar PV plant and the new 225 kV TL (200m) components will alter the landscape and have visual impacts.	Minor	(none)	Negligible
C2. The presence and operation of heavy machinery inside the solar PV site, at pylon locations, and along temporary access roads, leading to changes in the geology and geomorphology of the area, causing soil disturbance and degradation.	Minor	(none)	Negligible
C3. The use of machinery and temporary access roads leading to soil compaction, potential changes to water drainage flows, and local contamination from leaks and spills	Minor	Pollution Prevention Management Plan (The prevention of soil, groundwater and surface water contamination)	Negligible
C4. The generation of air and noise emissions from construction machinery leading to the generation of a nuisance and air pollution.	Minor	Pollution Prevention Management Plan (air emission, dust and noise)	Negligible
C5. The generation of hazardous and non-hazardous waste leading to soil and groundwater pollution.	Moderate – due to the lack of regional disposal facilities for hazardous waste, even if this is to be generated in small quantities.	Pollution Prevention Management Plan (Wastewater and drainage) Waste Management Plan	Minor
C6. The use of water for construction of the solar PV plant and TL and the workforce leading to a reduction in the availability of this resource to other users.	Minor	Water resources Management Plan	Negligible
<i>Impacts on the biological environment</i>			
C7. Potential impacts on habitats and species of flora	Minor	Biodiversity Management Plan	Negligible
C8. Potential Impacts on terrestrial fauna	Minor (Due to the absence of threatened species and the localized, avoidable nature of impacts; significance remains low with planned mitigation)	Biodiversity Management Plan	Negligible
C9. Potential impacts on avifauna	Minor (The presence of nationally protected species and PBF EBRD)	Biodiversity Management Plan	Negligible

Impact title	Initial impact	Management Plan with the control measures	Residual impact
<i>Impacts on social environment</i>			
C10. Labor and working conditions	Moderate – Given the remoteness of the site where the camp (if used) may be located, and the prevailing gender dynamics in Tunisia. Specific steps must be taken to prevent GBVH from taking place amongst the workforces. Women must also feel empowered to apply for local employment positions, equally to men.	Local recruitment plan Human Resources Management Plan and Human Resources Policies Worker Accommodation Plan (if required) Worker Code of Conduct and Security Personnel Code of Conduct Worker Grievance Mechanism	Minor
C11. The presence of child and forced labour at the workplaces of supply chain companies.	Major – as the suppliers to be used are unknown.	Supply Chain Management Plan	Minor
C.12 The capital spends by the EPC Contractor on businesses supplying materials and services, leading to an increase in revenue to the owners of the businesses used and potentially an increase in their workforce.	Minor to Moderate (+)	(none)	Minor to Moderate (+)
C13. The use of an installation workforce from the generation or continuation of employment, and the provision of training opportunities, leading to a sustained or increase in household income	Moderate – as the continuation of employment will benefit the household and reduce their socio-economic vulnerability.	Local recruitment plan	Moderate (+)
C.14. The generation of a limited number of local employment opportunities, leading to intra- and inter- community tensions arising from high expectations of the number of local employment opportunities.	Minor – As the decision as to ‘who’ is offered a temporary position (and therefore ‘who is not’ provided with such an opportunity) could result in protests and frustration towards the Project.	Local Recruitment Plan	Negligible
C.15. The road transport of materials and personnel using the public road network, use of construction machinery, and the presence of excavations, leading to health impacts to pedestrians and other road users, and local people	Major – As Tunisia has a poor road safety record and adjacent land users may not be familiar with frequent large truck movements taking place along local roads.	Traffic and Transport Management Plan	Minor
C.16. The occupational health and safety risks to the workforce leading to injuries or fatalities.	Major – as mistakes made could have fatal consequences.	Occupational Health and Safety Management Plan Emergency Response Plan	Minor
C.17. The use of security personnel to guard equipment and other areas leading to a reduction in the wellbeing of local residents.	Moderate	Security Management Plan (if required) Worker Code of Conduct and Security Personnel Code of Conduct Worker grievance mechanism	Minor

Impact title	Initial impact	Management Plan with the control measures	Residual impact
C.18. The restriction to access land inside the solar PV plant from installation of the perimeter fence.	Negligible - as the herder employed by the landowner stated during the engagement that there are alternative areas of land that can be used	None	Negligible
C.19. The construction of the solar PV plant, installation of TL, and use of temporary access roads, leading to disturbance and damage of subsurface archaeological remains where present	Moderate - protected cultural heritage have been identified in the project area (at 2.25 km).	Chance Find Procedure	Minor

Table 8.2 - Assessment of residual impacts during operational phase

Impact title	Initial impact	Management Plan with the control measures	Residual impact
<i>Impacts on physical environment</i>			
O1. Water requirements	Minor	Water Management Plan	Negligible
O2. Solid and liquid waste.	Minor	Waste Management Plan	Negligible
<i>Impacts on biological environment</i>			
O3. Potential Impact on Flora and Fauna (excluding avifauna)	Minor	Biodiversity Management Plan	Negligible
O4. Potential impact on avifauna	Minor	Biodiversity Management Plan	Negligible
<i>Impacts on social environment</i>			
O5. .Local and regional economy	Moderate (+) – as the continuation of employment will benefit the household and reduce their socio-economic vulnerability.	Local Employment Plan Local Content Policy Community Development Plan	Moderate (+)
O6. Improving access to and reliability of electricity through the development of renewable energy production infrastructure.	Major (+) strengthening the national energy mix.	(none)	Major (+)
O7. Potential labor law violations within the supply chain	Moderate – If no preventive measures are put in place, the risk may materialize and affect the project's reputation and legal compliance	Supply Chain Management Plan	Minor
O8. The generation of occupational health and safety risks for staff, resulting in injury or death.	Moderate	Occupational Health and Safety Management Plan Emergency preparedness and response Plan	Minor
O9. Potential impacts on human health related Electromagnetic Fields (EMF)	Negligible	None	Negligible
O10. Fire risk	Minor to moderate – Technically low risk but requiring rigorous prevention, detection, and rapid response measures	Fire risk prevention and management plan Emergency preparedness and response plan	Minor

9.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

The purpose of this section is to outline measures to avoid, minimise, mitigate, or compensate for environmental and social impacts to acceptable levels. The measures are described under the title of a management plan.

9.1 *Environmental and Social Management System (ESMS)*

The ESMP aims to provide high-level mitigation measures and requirements for the management of environmental and social risks anticipated by the project. Throughout the construction and operation phase of the project, an ESMS must be implemented by all parties involved (i.e. the Developer, the EPC contractor and the project operator). The ESMS must be specific to the project and site and must be based on and take into account the requirements of the ESMP. The development and implementation of an ESMS is considered a key requirement of the EBRD's EES1 and the IFC's PS1 and the ESMS .

9.1.1 During construction phase

The following project-specific management plans must be designed and implemented to manage impacts prior to the start of construction.

Project Developer

The following will be developed by the Developer:

- HR policies and procedures that reflect the combined requirements from Tunisian legislation and PS2/ESR2, including a Worker Grievance Mechanism.
- Permit and Consents Register which reflects the need to obtain (or renew as required) permits for the execution of the project to comply with all legal requirements and relevant authorizations.
- Stakeholder Engagement Plan and Project Grievance Mechanism
- An Environmental and Social Management Plan that will be inserted into the EPC contractor's tender documentation which reflects legally binding commitments to achieve sound E&S performance during the construction, in accordance with national legislation and EBRD's Environmental and Social Policy. This ESMP will also reflect the ESMS requirements of the EPC contractor (see below).
- Contractor Management Plan
- Emergency Preparedness and Response Plan (EPRP)
- Biodiversity Management Plan (BMP)
- Provide training to all the Developer's workers involved in the project concerning the topics covered in the Developer's existing Code of Ethics and Values which includes the prevention and management of GBV.
- Ensuring that all training activities will be evaluated using a formal evaluation process, and attendance shall be recorded using signed attendance sheets.

EPC contractor

The following management plans will be developed by the EPC contractor:

- HR policies and procedures
- Local Recruitment Plan
- Utilities Management Plan
- Worker Code of Conduct and Security Personnel Code of Conduct
- Worker Grievance Mechanism
- Human Resources Management Plan and human resources policies
- Worker Accommodation Plan (if required)

- Security Management Plan (if required)
- Emergency Preparedness and Response Plan
- Occupational Health and Safety Management Plan
- Traffic and Transport Management Plan
- Pollution Prevention Management Plan
- Waste Management Plan
- Chance Find Procedure
- Training Plan
- Supply Chain Management Plan
- Change Management Procedure
- Community Health and Safety Plan

Project operator

- HSE manual (in agreement with the Developer) which must include: (i) HSE policy; (ii) human resources policy and procedures; (iii) organisational structure and HSE responsibilities; (iv) HSE training, monitoring and reporting plan;
- Water management plan;
- Worker management plan;
- Waste management plan;
- Occupational health and safety plan;
- Emergency preparedness and response plan;
- Safety management plan;
- Local employment plan;
- Community development plan;
- Decommissioning framework plan.

9.1.2 During operational phase

During operation of the Project the management of impacts identified in Section 8 shall be integrated into an Operations ESMS, using the Construction ESMS as a basis. The Operations ESMS shall include the following management plans:

- Stakeholder Engagement Plan and Project Grievance Mechanism to provide information to stakeholders during operation of the Project, in the form of an Annual Environmental and Social Performance Report.
- Worker Code of Conduct to ensure responsible behaviour amongst the operational workforce undertaking PV maintenance activities, and to minimise the risk of harassment of women in the workplace.
- Worker Grievance Mechanism to provide a mechanism for workers to raise a complaint about their employment terms and conditions, should they wish to do so.
- Human Resources Management Plan to provide a framework for the management of the workforce.
- Emergency Response Plan to ensure that there is a coordinated response to an emergency that could occur during the operational stage involving the road maintenance workforce. This shall also include any procedures where maintenance teams may need to support emergency services in the advent an accident, for example, activating pollution control measures (e.g. closing outfall penstock valves.) to prevent the discharge of contaminated water (e.g. firefighting water) resulting from emergency response.
- Occupational Health and Safety Management Plan to manage occupational health and safety risks

- Pollution Prevention Management Plan. The plan must identify and define the necessary planned inspection and maintenance requirements for pollution prevention, including the use of water resources.
- Biodiversity Management Plan

9.1.3 During decommissioning phase

It is recommended that Votalia develops and adopts a comprehensive decommissioning plan in advance of handover to STEG (if it is the case). This measure will ensure that environmental and social requirements associated with the end-of-life phase of the Project are adequately addressed, in line with international good practice and lenders (IFC/EBRD) requirements.

9.2 *Environmental and Social Monitoring*

9.2.1 During the construction phase

During the construction phase, the Developer and the EPC contractor will carry out their own E&S monitoring activities, which are described in this section. Periodic checks may also be carried out by the *Regional Environment Directorate* or the ANPE as the national environmental regulator.

The Developer will carry out the following monitoring and control activities:

- Review and approval of the EPC contractor's ESMP prior to any mobilisation of equipment and personnel.
- E&S audit prior to the mobilisation of the EPC contractor before its departure for the site, to ensure that it has the adequate E&S resources necessary to implement the mitigation measures provided for in the ESMP.
- Quarterly E&S audit and inspection of the EPC contractor, from the start of construction work until completion.
- A pre-demobilisation audit to verify that disturbed areas have been effectively restored and rehabilitated.

The E&S monitoring report from the EPC contractor shall include the following:

- Daily HSE observation report indicating any corrective action taken in relation to safety breaches, hazardous acts and conditions observed.
- Weekly site inspections must be carried out using a checklist template, based on the requirements of the ESMS.
- Monthly submission to the Developer of the latest risk register, waste inventory register and results of audits undertaken (within the month) of any waste management infrastructure used by third parties;
- Compilation of a monthly E&S performance report covering the following topics:
 - E&S training activities undertaken, including driver training;
 - OHS incidents and community health and safety incidents (see below);
 - Details of fencing and protective measures installed to prevent unauthorised entry;
 - Number of commitments made to raise awareness among local communities of the risks associated with approaching construction works;
 - Results of ongoing vehicle inspections required by the traffic and transport management plan;
 - Number of supply chain companies audited in accordance with the supply chain management plan;
 - Water use and water sources used (including their authorised status);
 - Fuel consumption;

- Production of hazardous and non-hazardous waste by type and treatment/disposal facility used, including details of any third-party companies used for waste transfer;
- Number of workers on site, broken down by gender and locally recruited personnel, or part of the EPC contractor's core workforce;
- The number of third-party security personnel used to monitor equipment warehouses and field camps, details of their screening and training on the security code of conduct.
- The number of grievances submitted to the Developer per month;
- The number of grievances raised by EPC contractor workers;
- The number of operational camps and the date of their last internal inspection by the EPC contractor;
- Details of any incidents requiring the implementation of the emergency response plan and emergency scenario exercises carried out;
- Records of any disturbance to wildlife (including avifauna) and flora (whether accidental or not), including road accidents, irreparable damage to dens, burrows and nests;
- Record of evidence of poaching, illegal hunting of wildlife (including avifauna);
- Number of people employed and number of local recruits.

Monitoring and reporting on occupational health and safety

With regard to occupational health and safety reporting, the following leading and lagging indicators will be reported by the EPC contractor to the Developer on a monthly basis:

Lagging indicators:

- The lost time injury frequency rate (LTIFR), which measures serious injuries occurring in the workplace and resulting in employee absenteeism
- The lost time injury frequency rate (LTIFR), which includes all recordable incidents, such as cases requiring medical treatment, work restrictions and accidents resulting in lost time.
- Severity rate: Reflects the average impact of injuries in terms of lost working days
- Fatal accident rate: Number of fatal accidents in the workplace relative to the total number of hours worked or relative to the number of employees.

Leading indicators:

- The hazard reporting rate, which indicates how many hazards are identified and reported by workers.
- Safety training completion rate, which corresponds to the percentage of employees who have completed mandatory occupational health and safety training programmes.
- Inspection and audit compliance, which is the percentage of scheduled safety inspections and audits completed on time.
- The corrective action closure rate, which measures the percentage of identified issues that are resolved within a defined timeframe.
- Near miss reporting rate, which measures the number of reported and followed up near misses.
- Personal protective equipment (PPE) compliance: percentage of workers observed complying with PPE requirements during audits.
- Behaviour and engagement indicators, which aim to ensure that a safety culture is maintained.
- Safety briefing attendance rate, which is the percentage of workers who regularly attend safety briefings.
- Employee engagement in safety programmes, which measures participation in OHS initiatives, such as volunteering on safety committees.
- Feedback utilisation rate, which indicates how often workers' safety suggestions are implemented.

- The receipt, recording, investigation, and follow-up of grievances, including GBVH-related grievances.

Health and well-being measures

- Occupational disease rate (ODR), which measures the number of diseases directly related to the work environment.
- The health check-up participation rate, which measures the percentage of workers participating in regular health check-ups.

9.2.2 During the operational phase

During the operational phase, the operator will collect the following information on a monthly basis and report it to the EBRD and the IFC:

- HSE training activities undertaken;
- Occupational safety and health incidents;
- Community health and safety incidents;
- Any details on damage to biodiversity (flora and fauna (including avifauna)), including affected species and their life stage (juvenile, etc.);
- Number of bird collisions with the solar PV plant infrastructure and the high-voltage transmission line, including species and life stages;
- Bird mortality and injury rates;
- Record of any disturbance to fauna (including avifauna) and flora (accidental or otherwise) associated with maintenance activities.

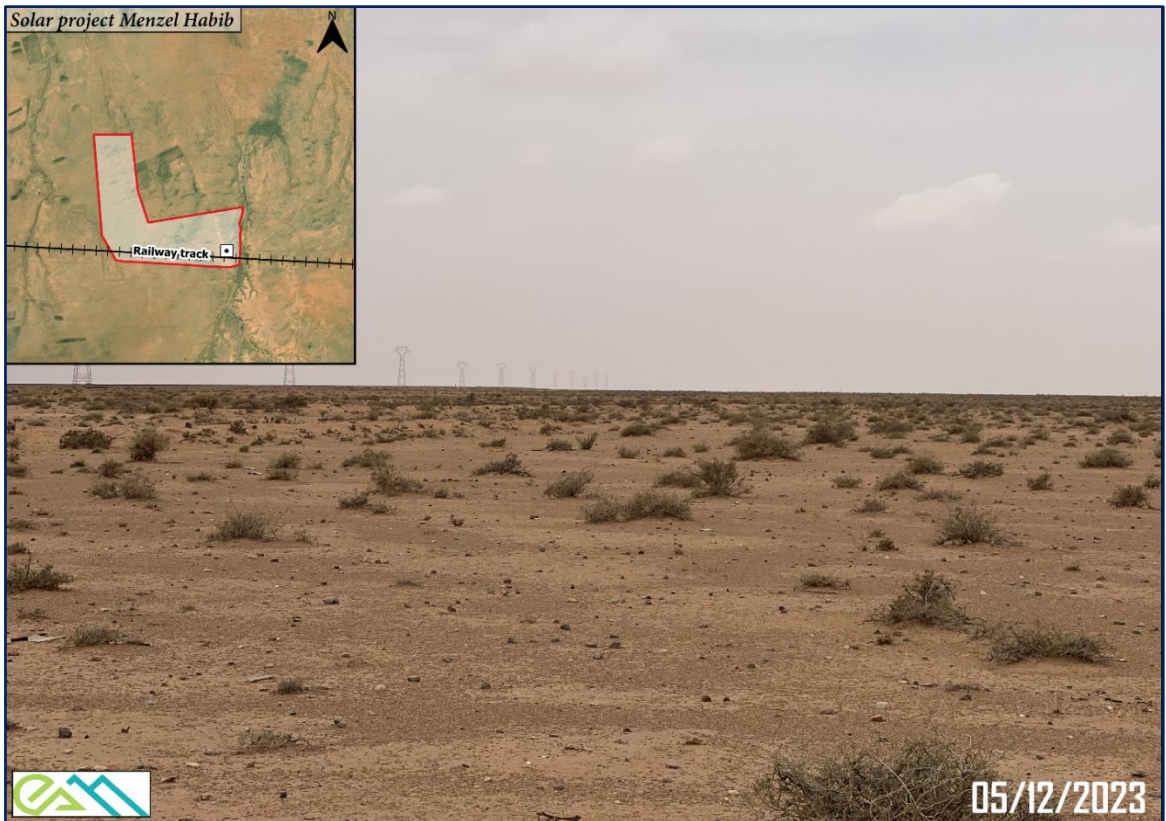
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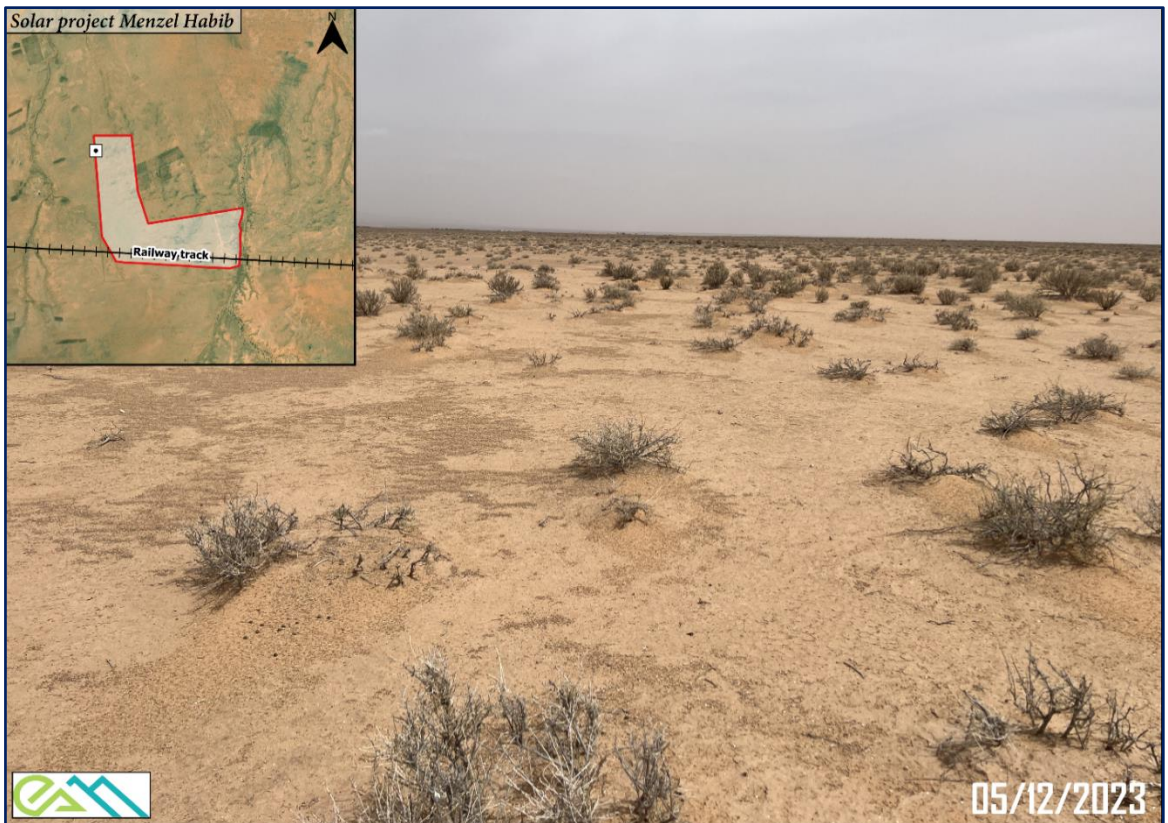
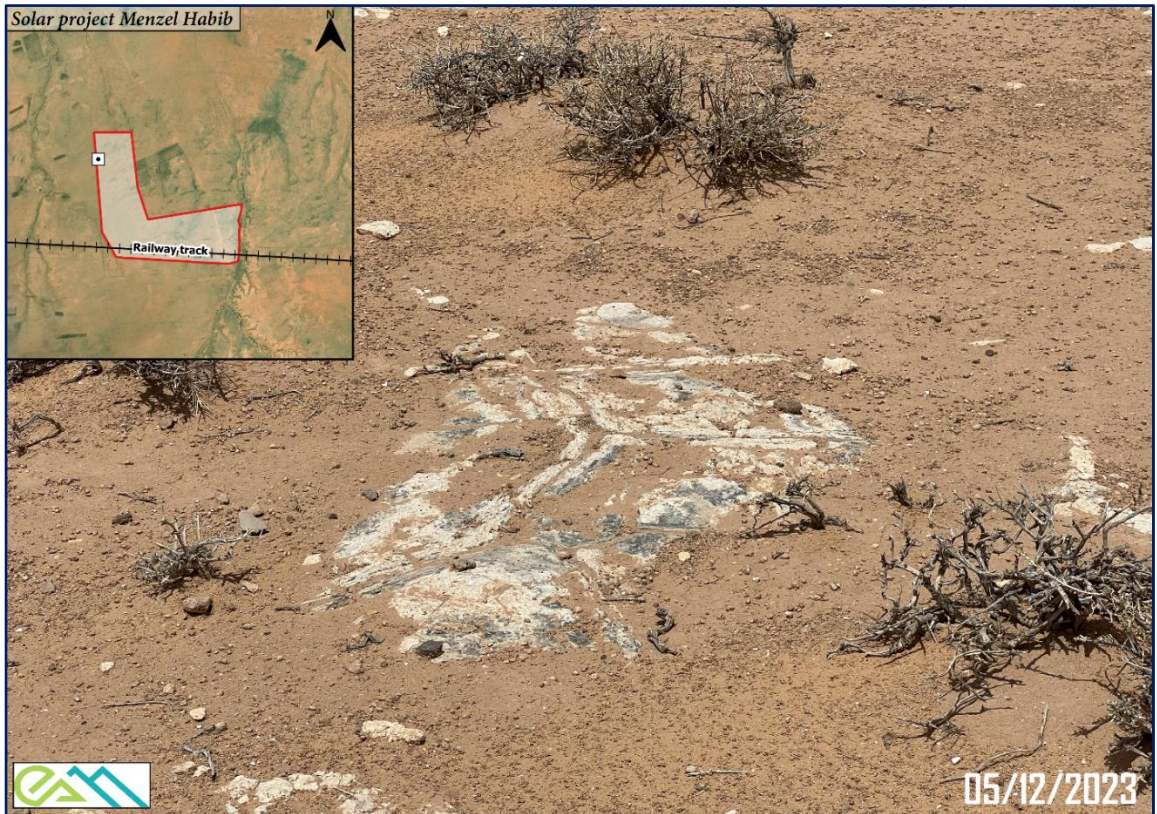
APPENDICES

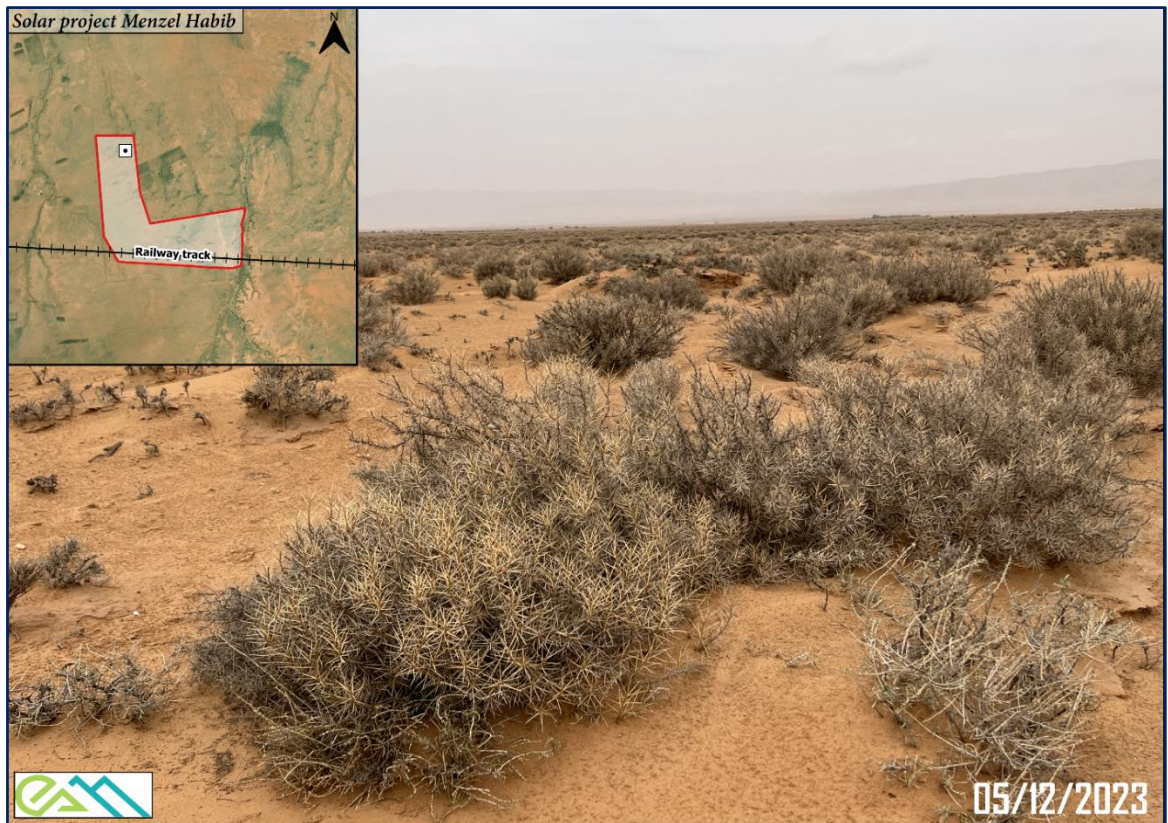
APPENDIX 1 - Geolocated photos of the solar PV plant site











APPENDIX 2 - Biodiversity report for the solar PV plant

APPENDIX 3 – Avifauna report for the solar PV plant

APPENDIX 4 - Archaeological report for the solar PV plant