PREPARED FOR

North Oman Solar PV Project

ESIA Report B

DATE
18 October 2024

REFERENCE
0733953

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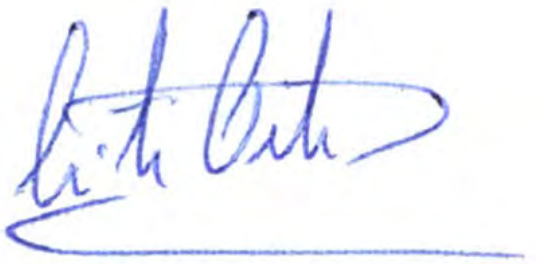
North Oman Solar PV Project

ESIA Report B – Executive Summary

0733953



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List of Acronyms

Name	Description
5OES	Five Oceans Environmental Services
AA	Alternative Analysis
AADT	Annual Average Daily Traffic
ADs	Administrative Decisions
AEP	Annual Exceedance Probability
AIS	Air-Insulated Switchgear
ALARP	As Low As Reasonably Practicable
AN	Anno Domini
AoI	Area of Influence
APSR	Authority for Public Services Regulations
AQ	Air Quality
AR	Assessment Reports
ARVI	Atmospherically Resistant Vegetation Index
ASTM	American Society for Testing and Materials
BAP	Biodiversity Action Plan
BAT	Best Available Technique
BAU	Business-As-Usual
BCE	Before Common Era
BOO	Build, Own and Operate
BOP	Blowout Preventer
BP	years before present
BRGM	Bureau de Recherches Géologiques et Minières
CAA	Civil Aviation Authority
CAAQMS	Continuous Ambient Air Quality Monitoring Station
CCHF	Crimean Congo Hemorrhagic Fever
CCRA	Climate Change Risk Assessment
CE	Common Era
CEMMP	Construction Environmental Management and Monitoring Plan
CEMP	Construction Environmental Management Plan
CHA	Critical Habitat Assessment
CHMP	Cultural Heritage Management Plan
CIA	Cumulative Impact Assessment
CIP	Climate Impact Platform
CLO	Community Liaison Officer

Name	Description
CLVIA	Cumulative Landscape and Visual Impact Assessment
CMIP	Coupled Model Intercomparison Project
CR	Critically Endangered
CRM	Collision Risk Monitoring
CSP	Concentrated Solar Power
CWMP	Construction Waste Management Plan
dB	decibel
DC	Direct Current
DGEA	Directorate General of Environmental Affairs
DLR	Dynamic Line Rating
DM	Diabetes Mellitus
DTM	Digital Terrain Model
E&S	Environmental and Social
EA	Environmental Authority
EAAA	Ecologically aApropriate Areas of Analysis
ECLJ	European Centre for Law and Justice
EHS	Environmental, Health and Safety
EN	Endangered
EOR	Enhanced Oil Recovery
EP	Equator Principles
EPC	Engineering, Procurement and Construction
ERM	Environmental Resource Management
ERP	Emergency Response Plan
ESIA	Environmental and Social Impact Assessment
ESMM	Environmental and Social Management and Monitoring
ESMMP	Environmental and Social Management and Monitoring Plan
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
EU	European Union
EUNIS	European Nature Information System
EVI	Enhanced Vegetation Index
FAO	Food and Agriculture Organization
FFDI	Forest Fire Danger Index
FGD	Focus Group Discussion

Name	Description
FID	Final Investment Decision
FOC	Fiber Optic Cord
GCC	Gulf Cooperative Council
GCD	Global Climate Database
GDP	Gross domestic product
GEF	Global Environment Facility
GHG	Greenhouse Gas
GII	Gender Inequality Index
GIIP	Good International Industry Practice
GIP	Good International Practice
GIS	Geographical Information System
GMC	Global Climate Models
GPH	Good Practice Handbook
GR	Group Rules
GSO	GCC Standardization Organization
ha	hectare
HDV	Heavy Duty Vehicle
HIV/AIDS	Human immunodeficiency virus/ Acquired immunodeficiency syndrom
HR	Human Resources
HRIA	Human Rights Impact Assessment
HRrA	Human Rights Risk Assessment
HV	High Voltage
IAQM	Institute of Air Quality Management
IBA	Important Bird and Biodiversity Areas
IBAT	Integrated Biodiversity Assessment Tool
IBS	Industrial Baseline Survey
IBTrACS	International Best Track Archive for Climate Stewardship
ICV	In-Country Value
IEA	International Energy Agency
IFC	International Finance Corporation
ILO	International Labour Organization
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
IUCN	International Union for Conservation of Nature

Name	Description
IWMI	International Water Management Institute
JV	Join Venture
KBA	Key Biodiversity Areas
KII	Key Informant Interviews
km	kilometer
KPI	Key Performance Indicators
KV	Kilovolt
LC	Least Concern
LCA	Landscape Character Areas
LDC	Load Dispatch Centre
LDV	Light Duty Vehicle
LLC	Limited Liability Company
LNG	Liquefied Natural Gas
LTA	Lenders Technical Advisors
LV	Low Voltage
LVAC	Low Voltage Alternating Current
LVIA	Landscape and visual amenity
m	meter
MAF&WR	Ministry of Agriculture, Fisheries and Water Resources
MCIIP	Ministry of Commerce, Industry and Investment Promotion
MDO	Minerals Development Oman
MDs	Ministerial Decisions
MECA	Ministry of Environment and Climate Affairs (not in use)
MEM	Ministry of Energy and Minerals
MHT	Ministry of Heritage and Tourism
MIS	Main Interconnected System
MOH	Ministry of Health
MP	Management Plan
MSDS	Material Safety Data Sheet
MTCIT	Ministry of Transport, Communication and Information Technology
MV	Medium Voltage
MW	Megawatts
NASA	National Aeronautics and Space Administration
NCSI	National Centre for Statistics and Information

Name	Description
NDC	Nationally Determined Contribution
NDVI	Normalized Difference Vegetation Index
NGO	Non-Governmental Organization
NIR	Near-infrared
NNR	National Nature Reserve
NOC	No Objection Certificate
NT	Near Threatened
NTS	National Tourism Strategy
OHS	Occupational Health and Safety
OHSP	Occupational Health and Safety Plan
OHTL	Overhead Transmission Line
OMP	Operational Monitoring Programme
OMR	Omani Rial
ONMP	Operational Noise Management Plan
ONSS	Oman National Spatial Strategy
OQAE	OQ Alternative Energy LLC
OSCP	Oil Spill Contingency Plan
PAH	Polyaromatic hydrocarbons
PDO	Petroleum Development Oman LLC
PERC	Passivated Emitter and Rear Contact
PFLOAG	Popular Front for the Liberation of Oman and the Persian Gulf
PM	Project Manager
POHOL	Private Oil Holdings Oman Ltd.
POPs	Persistent Organic Pollutants
PPE	Personal Protective Equipment
PS	Performance Standards
PV	Photovoltaic
QHSE	Quality, Health, Safety, and Environment
RAECO	Rural Areas Electricity Company
RCIA	Rapid Cumulative Impact Assessment
RD	Royal Decree
RO	Reverse Osmosis
ROP	Royal Oman Police
RW	Riyah Wind

Name	Description
SARDS	Sustainable Agriculture and Rural Development Strategy
SAVI	Soil Adjusted Vegetation Index
SBS	Social Baseline Study
SCADA	Supervisory Control and Data Acquisition
SEP	Stakeholder Engagement Plan
SEZAD	Special Economic Zone at Duqm
SLM	Sound Level Meter
SNDC	Saih Nihayda Depletion Compression
SOAG	Oman Wastewater Services Company
SoW	Scope of Work
SPL	Sound Pressure Level
STP	Sewage treatment plant
TCFD	Task Force on Climate-Related Financial Disclosure
TMP	Traffic Management Plan
TPH	Total Petroleum Hydrocarbon
TSF	Temporary Site Facilities
TSO	Transmission System Operator
TSP	Total Suspended Particulates
TSP	Total Suspended Particulate
TTE	TotalEnergies Renewables Development Middle East LLC
TVOC	Total Volatile Organic Compound
TWW	Treated wastewater
UAE	United Arab Emirates
UN	United Nations
UN SDGs	United Nations Sustainable Development Goals
UN-DESA	United Nations Department of Economics and Social Affairs
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UN-ESCWA	United Nations Economic and Social Commission for Western Asia
UNGP	United Nations Guiding Principles
UNICEF	United Nations International Children's Emergency Fund
US$	US Dollar
USEPA	United States Environmental Protection Agency
USGS	United States Geological Services

Name	Description
UTM	Universal Transverse Mercator
VEC	Valued Environmental and social Component
VOCs	Volatile Organic Compounds
VP	Vantage Point
VU	Vulnerable
WBG	World Bank Group
WEEE	Waste Electric/electronic equipment
WHO	World Health Organization
WMP	Waste Management Plan
WRI	World Resources Institute
WSDI	Warm Spell Duration Index
WTG	Wind Turbine Generator
WTTC	World Travel & Tourism Council
WWTP	Wastewater Treatment Plant
ZTV	Zone of Theoretical Visibility

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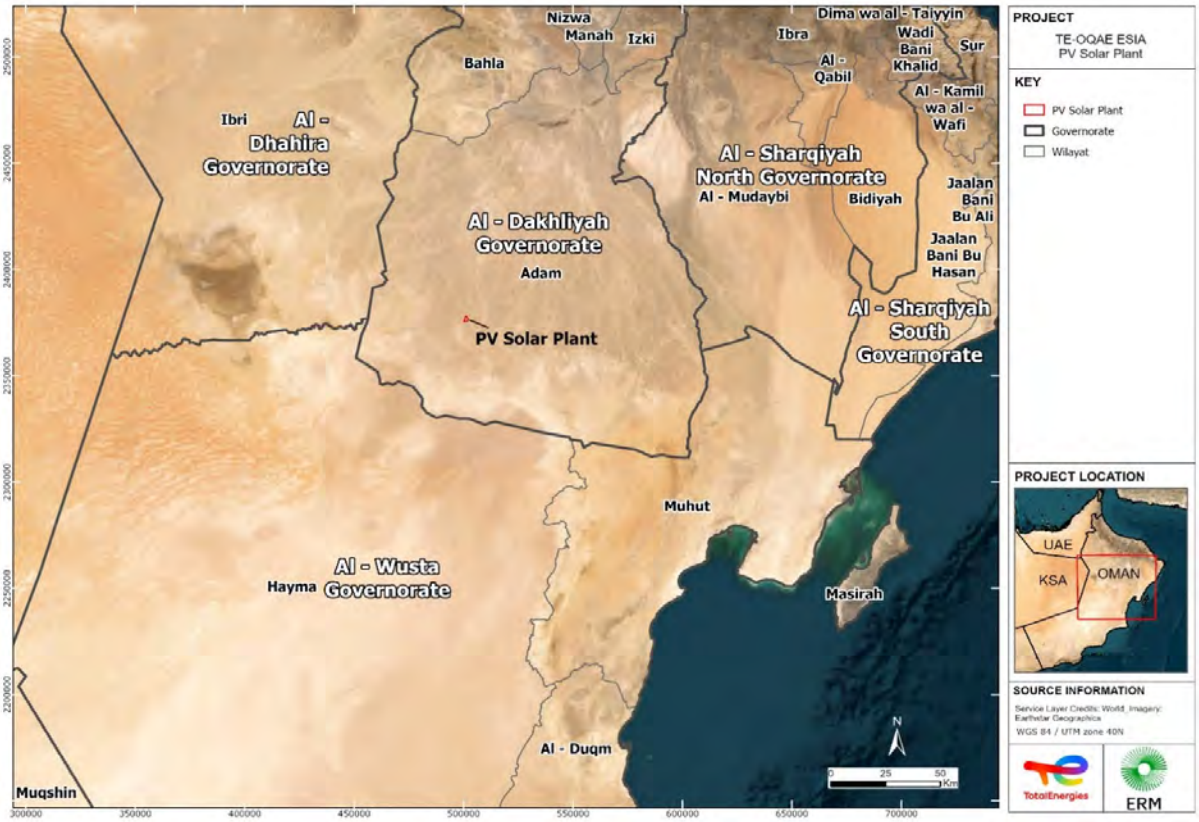
0 EXECUTIVE SUMMARY

0.1 INTRODUCTION

TotalEnergies Renewables Development Middle East LLC (TTE), together with OQ Alternative Energy LLC (OQAE), both being the "Project Proponent" or "Project Company", are developing the proposed North Oman Solar PV Project to be located in the province (wilayat) of Adam, Governorate of Al Dakhiliyah, Sultanate of Oman, hereafter referred to as the Project (Figure 0.1). TTE and OQAE will create a joint venture (JV) company to be registered in Oman (currently unnamed), which will be responsible for the development of this Project.

The Project will consist of an onshore Solar PV plant of 218,805 PV modules, with an installed capacity of 105 MW. Other project components will include an underground cabling network, a step-up substation, an internal road network, meteorological stations, and associated construction and operation facilities. Generated electricity from the Solar PV Plant will be evacuated to the grid of Petroleum Development Oman LLC (PDO, the "Off-taker"). Therefore, power evacuation from the Project's step-up substation to the existing PDO's Saih Nihayda Depletion Compression substation will require a 132 kV interface yard and a transmission line of about 5 km long. Power evacuation components are not part of the Project' scope, but are considered associated facilities; their design, construction, operation, and decommissioning will be carried out by PDO as a separate transmission project, with the corresponding environmental assessment and permitting process.

FIGURE 0.1 PROJECT LOCATION



Source: ERM, 2024

A local EIA compliant with Omani Regulations ("ESIA A") was prepared by Five Oceans Environmental Services (5OES), taking into consideration the Scoping Report's requirements.

The current document corresponds to the International Environmental and Social Impact Assessment Report ("ESIA B") for the Project. This report has been prepared by Environmental Resources Management (ERM) and 5OES. ESIA B is focused on meeting international standards for potential international financing. It also considers the permit conditions issued by the Environmental Authority (EA) in October 2024 as a result of the local EIA A approval. It is noteworthy that there was an initial set of permit conditions issued by EA in July 2024 after the approval of the Local ESIA A; however, some of these were discussed due to potential inapplicability, between the Project Proponent and EA on 23rd September 2024; being the final version of these permit conditions issued in 17th October 2024. Appendix B includes a copy of the EA's Local Environmental Permit and final permit conditions.

Finally, it should be noted that ESIA B will be subsequently updated by ERM/5OES (under the name of "ESIA C"), incorporating the results of the social disclosure events.

0.2 LEGISLATION CHAPTER

Environmental protection within Oman is primarily governed by the "Law for the Conservation of the Environment and the Prevention of Pollution" (Royal Decree 114/2001) administered by the Environmental Authority (EA; previously called the Ministry of Environment and Climate Affairs, MECA). The environmental permitting process is regulated by the Authority Decision 107/2023 issued in August 2023.

In accordance with national legislation (MD 48/2017), the Project is classified as a Category 'A' activity and requires an Environmental Impact Assessment (EIA). The EIA A was approved by Oman's Environmental Authority (EA) in July 2024.

As International financing is planned to be required for the Project to proceed, the IFC Environmental, Health and Safety (EHS) Guidelines and the Equator Principles (EP4) are considered. Consequently, a Climate Change Risk Assessment (CCRA) has been prepared following EP4's 2023 Guidance Note for CCRA. According to EP4, for projects classified as Category B according to IFC classification (as in this case), a Physical CCRA is required. In this case since combined Scope 1 and Scope 2 GHG emissions are not expected to exceed 100,000 tCO_2 equivalent annually, the requirement of a Transition CCRA and GHG Alternatives Analysis (AA) is not triggered.

In addition, as established by EP4, a Human Rights Risk Assessment (HRRA) and a Critical Habitat Assessment have been prepared to assess potential human rights risks and to determine potential critical habitats that need to be taken into account by the Project throughout construction and operation phases.

In addition, TotalEnergies' corporate standards will also be applied to the development of the ESIA.

0.3 PROJECT DESCRIPTION

The Project comprises an onshore Solar PV farm with a 105 MW (128 MWp) installed capacity and a maximum delivered capacity of 105 MWac at day. The production will be met through the installation of 218,805 PV modules, each with a capacity of 585 Wp. There is another option being managed by the Project Proponent of less PV modules (206,460 PV modules) with

a higher capacity (620 Wp); however, at this stage, the first option is the one being described across the document.

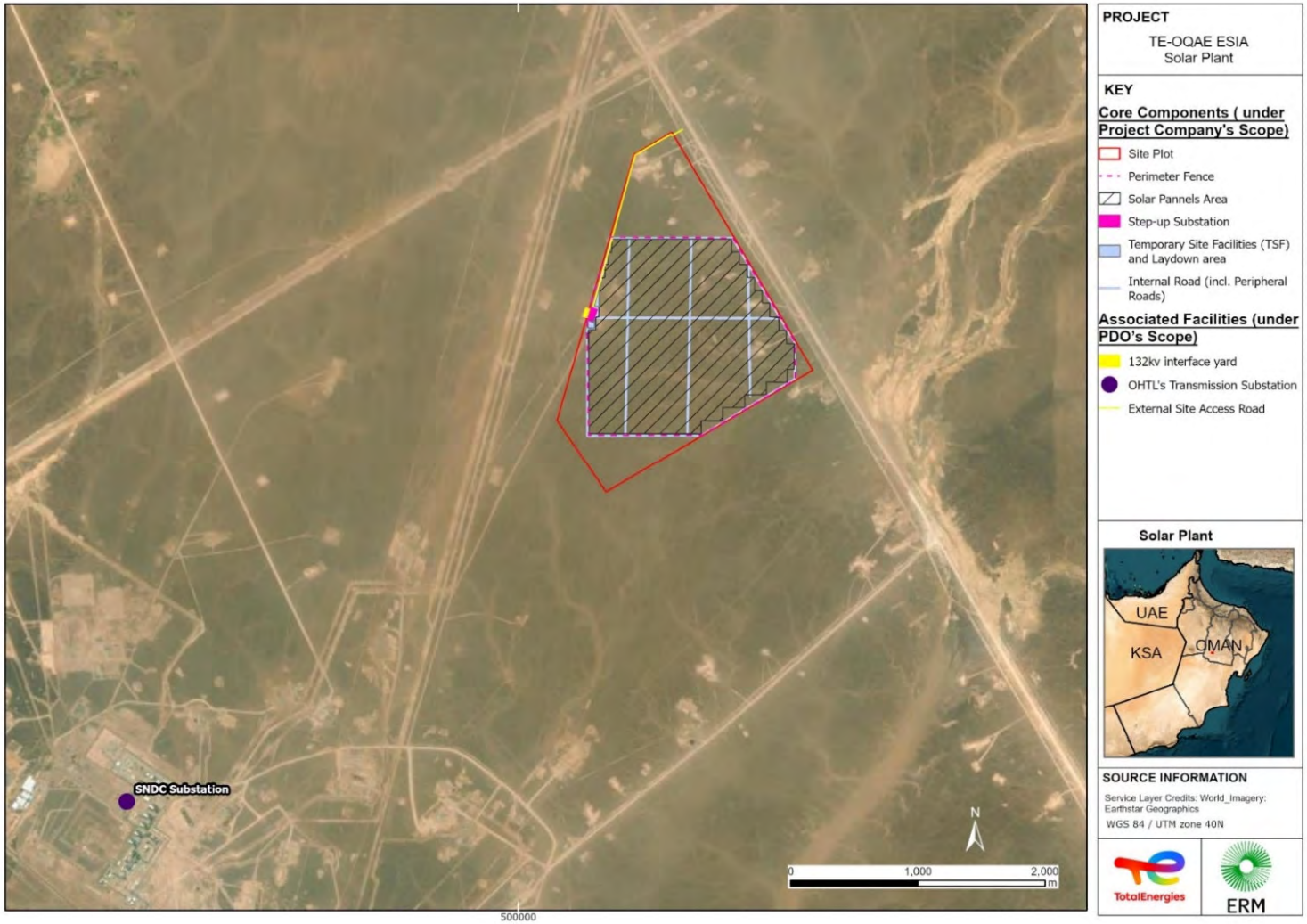
Generated electricity from the solar panels will be transmitted via a buried Medium Voltage (MV) collection cable system to a step-up substation, located at the west of the solar farm, where two power transformers will be placed to step-up the voltage to PDO's requirements (the Off-taker). Power evacuation from the step-up substation to the existing PDO's Saih Nihayda Depletion Compression (SNDC) substation will require a 132 kV interface yard and a Twin ELM 132 kV overhead transmission line (OHTL) of about 5 km long. Power evacuation components are not part of the Project' scope, but are considered associated facilities; their design, construction, operation, and decommissioning will be carried out by PDO as a separate transmission project, with the corresponding environmental assessment and permitting process.

The Project site plot comprises 302 ha of leased land located on the south border of the Governorate of Al Dakhiliyah, specifically in the Wilayat of Adam, in the northern region of Oman. The elevation of the Project site ranges from 126 m to 145 m above mean sea level. The site is situated in a flat desert with shrubs scattered around the area.

The Project is located within PDO's Block 6 concession area and close to PDO's Saih Nihaydah gas depletion compression facility at approximately 4 km whose purpose is to maintain reservoir pressure in the wells that make up the field. The nearest well is approximately 700 m away from the Project site. The closest airport (Qarn Alam) is located approximately 11 km south of the Project site; this airport is owned and operated by PDO. It should be noted that the Project Proponent has obtained a No Objection Certificate (NOC) from the Civil Aviation Authority (CAA) for the development and operation of this Project.

The location of the Project site and key components of the project are shown in Figure 0.2.

FIGURE 0.2 PROJECT LAYOUT



Source: ERM, 2024

The Project comprises the construction and operation of an onshore solar farm and associated infrastructure. Key project components are summarized in Table 0.1

TABLE 0.1 KEY PROJECT COMPONENTS

Element	Details
PV Modules, Inverters and Mounting system	• A total of 218,805 PV modules (7,545 strings x 29 In series), each with a capacity of 585 Wp. It should be noted that there is another option of using 206,460 PV modules, each with a capacity of 620 Wp; however, at this stage, the first option is the one being described across the document. • A total of 13 box-type LV-MV transformers. • Module mounting structure type will be single axis tracker. Total number of trackers will be 2,515.
External site access road (Associated facility)	• The Project site will be accessed from public paved Road 31 via a graded access road to be constructed by PDO as part of Project agreements and is outside the scope of this Project. The anticipated length of the new external access road is 1.67 km.
Internal roads (incl. peripheral roads)	• The internal road network will consist of approximately 11.2 km of newly constructed tracks. These will have a width of approximately 6 m, which includes 0.5 m shoulder on each side.
On-site electrical connections and step-up substation	• On-site medium-voltage (MV) cabling will be laid underground within the internal road corridor (where possible), linking the 13 LV-MV transformers to the 33kV switchgear in the step-up substation. • The step-up substation will be located in the west center of the Project plot. Two high-voltage (HV) transformers in the step-up substation will be used to step-up the voltage of the electricity for evacuation into PDO's grid to 132 kV.
Interface yard and overhead Transmission line (OHTL) (Associated facilities)	• An interface yard (including AIS bay and OHL tower), and an OHTL of approximately about 5 km long from the Project's step-up substation to PDO's SNDC substation will be constructed by PDO as part of Project agreements and is outside the scope of this Project.
Temporary construction compound	• A temporary construction compound of approximately 0.6 ha will be required during the construction phase of the Project, and it will comprise two areas of Temporary Site Facilities (TSF) and laydown areas. For some electrical panel and electronic equipment, a shed laydown area will be provided to protect the package from the sun rays and rain. For PV modules and mounting structures, several temporary laydown areas will be provided within the site to reduce the distance of in-site transportation.
Meteorological stations	• 5 meteorological stations evenly distributed within the boundary of the Project site will be installed.
Perimeter fence	• Since PV installations represent a large financial investment, a site perimeter fence will be constructed, with an approximate length of 5.6 km.

The Project schedule comprises the following three phases:

- Construction/pre-commissioning/commissioning phase: Site preparation; Construction of temporary construction compound, lay-down area and guardhouse; Construction of internal roads and drainage system (as required), inter-linking the external site access road, panels' locations and step-up substation; Installation of security fencing and security

system around the Project site; Vehicle movement; Influx of workers; Installation of inverters, transformers, PV panels and their foundations, step-up substation, meteorological stations, electrical infrastructure and signal cables; Excavation of trenches for cable laying; Resource consumption (water, energy, etc.); Waste and wastewater management; Removal of construction equipment and temporary facilities and reinstatement; and Commissioning of site equipment.

- Operational phase: including the following activities: Workers management; Vehicle movement; Routine inspections and site maintenance and security; Routine road maintenance; Resource consumption (water, energy, etc.); Dry cleaning of the PV modules using a robotic system (cleaning robot operator working 8 h/day in night shift mainly); Waste and wastewater management; Remote monitoring of the power generation performance.
- Decommissioning Phase: including the following activities: Removal, recycling/disposal of surface structures; Movement of vehicles, equipment, personnel; Storage and handling of fuels and chemicals; Treatment and disposal of wastes; Reinstatement and restoration of the affected sites.

At some point, the decommissioning phase could be replaced by a repowering phase, which would involve a similar set of activities as the construction and decommissioning phase. It should be noted that repowering or decommissioning is not part of the Project Proponent's scope. The solar farm is planned to be handed over to the Off-taker (PDO) in year 19 of the operational lifetime of the Project as part of the Project agreements. Therefore, PDO will be responsible for this phase.

During the peak of construction, it is expected there will be about 500 workers on the Project site. The Project will source locally based construction workers where feasible (e.g. low-skilled labourers). The Project will adhere to applicable Omani labour regulations and Omanisation quotas. Working schedule will be 10 hours per day with overtime of 2 hours for some sections. Work will be implemented on a rotation or shift system basis.

Internationally recognized and local worker conditions, health, safety, and environment standards for workers will be applied. These will include full-time doctors and paramedics employed to provide 24-hour medical cover by direct presence or on call.

During operation, the Project will require up to 10 full-time staff to keep the facility maintained and working and about 15 site engineers/technicians to be outsourced from local third parties for schedule maintenance.

The Project will make use of the existing facilities and infrastructure at the region. Some facilities are expected to be used directly (e.g. existing PDO accommodation camp and existing roads). Other roads will be slightly modified in order to reach the site.

0.4 ASSESSMENT OF ALTERNATIVES

The site selection process was part of PDO's scope, considering the potential solar resource and their demand/load centers. Post-assessing the feasibility study, PDO identified the Project site for further development with defined capacity (in Mega Watts) and released the Bid documents accordingly. Minimum Functional Specifications (MFS) and certain design limits were also set by PDO as part of their bidding process for this renewable energy project. The

Project Proponent participated in the bidding process and proposed the Project layout and design presented in this study.

The option of not proceeding with the development is discarded when considered against the benefits of establishing a new renewable energy source and against national strategies and global tendencies.

0.5 STAKEHOLDER ENGAGEMENT

The preparation of a Stakeholder Engagement Plan (SEP) is a key component of sustainable development and the ESIA process. Stakeholder engagement involves those stakeholders interested in or affected by a proposed development working to actively identify opportunities, risks and issues of concern. Effective stakeholder engagement and public consultation is a cornerstone of successful Project development. TTE/OQAE are committed to the engagement with stakeholders throughout the Project lifecycle. A Stakeholder Engagement Plan has been developed for the Project and is appended to this ESIA. This document identifies Project stakeholders, presents past engagement activities as well as the commitments of the Project Proponent with regard to stakeholder engagement and grievance management as the Project progresses.

For the Project, the primary objectives of stakeholder engagement are:

- To be open and transparent with stakeholders.
- To be accountable and willing to accept responsibility as a corporate citizen and to account for any potential impacts associated with Project activities.
- To have a relationship with stakeholders that is based on listening and dialogue as main pillars, as well as trust and a mutual commitment to an appropriate form of engagement.
- To respect stakeholders' interests, opinions and aspirations and ensure safe participation.
- To work collaboratively and cooperatively with stakeholders to find solutions that meet common interests and boost effectiveness.
- To be responsive and to coherently respond in good time to stakeholders.
- To be pro-active and to act in anticipation of the need for information or potential issues.
- To engage with stakeholders such that they feel they are treated fairly and their issues and concerns are afforded fair consideration based on equal human rights.
- To be accessible and within reach of stakeholders so that they feel heard and to provide comprehensive information.
- To be inclusive and proactively anticipate, identify and include all stakeholders.

Stakeholders were identified on the basis that they may influence or be impacted by the Project and would also be able to provide insight into possible issues and concerns related to the Project.

0.5.1 ENGAGEMENT PROCESS TO DATE

Stakeholders identified to date represent the organisations and individuals who may be directly or indirectly (positively or negatively) affected by the Project or who may have an effect on how the Project is implemented.

Stakeholders identified to date for inclusion in engagement activities meet one of the following criteria:

- Have an interest in the Project;
- Would potentially be impacted by or have an influence on the Project (negatively or positively); and/or,
- Could provide commentary on issues and concerns related to the Project.

Stakeholders were categorised, based on their various needs, interests, and potential influence on the Project.

Engagement as part of the baseline (integral component in the development of the ESIA report) process was conducted between 9th and 11th July 2024 and was led by a combined Five Oceans and ERM Team, and executed by 5OES. The purpose of the field survey was:

- To collect specific socioeconomic, health, and human rights data at the local level to the extent available and at the Wilaya level; and
- To establish initial contact with key stakeholders and introduce the Project.

As part of the engagement process conducted in 2024, meetings were conducted in July 2024 with the Wali of Adam and other local government representatives as well as with Women Associations, to disclose basic Project information and collect feedback on the Project and request baseline data.

Initial feedback from all stakeholders was overwhelmingly positive, recognizing the benefits these projects bring to the Petroleum Development Oman (PDO), the nation’s leading exploration and production company with a 60 percent government interest.

While the potential impacts were noted, they did not lead to significantly in-depth discussions on any. Stakeholders referred to recent wind and solar projects in the region, reaching a consensus that there were no major negative impacts from these projects from their perspective.

The primary focus of discussions with stakeholders was the benefits of the Project. There is a general pre-existing expectation that oil and gas companies operating in the area should invest locally in various ways. However, it is acknowledged that oil and gas companies often have their own protocols, standards, and strategies for social investment, which may not always align with the community's desired level or means of socio-economic contribution.

Employment remains a national priority, with each Wilayah aiming to reduce the number of registered jobseekers. This expectation is an important consideration for all stakeholders involved.

0.5.2 ESIA DISCLOSURE

EIA Rev A was disclosed with relevant stakeholders in July 2024. Details about how the feedback of the ESIA disclosure process has shaped this version B of the ESIA are included in Section 5 of the Stakeholder Engagement Plan, and in Appendix F to the ESIA. The feedback provided by stakeholders is sumarised below:

TABLE 0.2 OVERVIEW OF THE KEY FEEDBACK RECEIVED DURING THE ESIA DISCLOSURE PHASE HELD IN JULY 2024

Subject	Ad Dakhiliyah
Project's perception	• Overall positive welcoming of the Project • Query regarding location selection rationale and if the Project would meet PDO's energy requirements.
Local economy and livelihoods	• The primary sources of income include selling camels and private sector jobs in oil and gas companies operating in the area. • Employment rate amongst residents of the Wilayat is dependent on the opportunity/ role. Some residents have Master's and PhD qualifications. • Oil and gas companies use a centralized system for employment which does not enable prioritization for local employment
Community land uses (e.g., grazing, access rights)	• Residents of Aby Thaylah graze in the area of the Project site. However, the importance of the Project site as a grazing area could not be confirmed by those attending the stakeholder's meeting.
Community health, safety and development needs	• Dust and traffic related accidents, sometimes involving camels with suggestions to install road fencing.
Unique regional culture and heritage (e.g., language, traditions of local tribes, handicrafts)	• It was confirmed that the predominant tribe in Bu Thayla and Sayh An Nuhaydah is Al-Durai. • It was clarified that there are no archaeological sites in the area.
Environmental, Health and Social Impacts	• Query on the environmental impact and impact on nearby residents and their camels as well as expected benefits to the nearby settlements. • Anticipation of various benefits, including employment, provision of electricity and other contributions to the communities.
Project Social Investment and Responsibility	• Emphasis on the importance of focusing on social and economic returns/benefits to the Wilayah, with priority to locals and LCCs • Extending the project's output supply to serve the nearby settlements is suggested
Stakeholder Engagement	No Feedback received
Grievance mechanism	• Suggestion to involve members of the municipal council in the grievance mechanism.

The final ESIA Report (version B) in English language along with a Non-Technical Summary in Arabic language, will be made available to stakeholders and general public for a period of 30 calendar days. The disclosure will be facilitated through electronic access via a link.

Other means by which stakeholders will be able to provide feedback include:

- Using feedback forms which will be available via the same link where the ESIA (version B) and the Non-Technical Summary in Arabic language will be uploaded.
- Calling to the phone number: 00968 92120082, during the entire ESIA disclosure period;

- Electronic communication, via email at NOS.Grievance@oq.com, during the entire disclosure period.

Anonymous feedback will be also accepted.

0.6 PROJECT BASELINE CONDITIONS

0.6.1 PHYSICAL ENVIRONMENT

The climate of Oman is typically tropical hyper-arid and the region is dry with large seasonal and daily variations in temperature; rainfall is irregular with large variations between years. The project area is influenced by the Indian monsoon system. The onset of the Indian Monsoon over the Arabian Sea occurs in May and the monsoon builds to reach full strength by June and starts to weaken by mid-September.

Average annual temperature ranges from an average minimum of 7°C in January to an average maximum 47.9 °C in July. Rain falls infrequently at Qarn Alam, tends to be more frequent in December and March (during the onset and wind down of the NE Monsoon), and also in the summer months (June to August) during infrequent rain fall events. Although rain is rare during summer months, storms can be intense and therefore influence the annual average rainfall figures. Conditions at Qarn Alam are generally sunny (22 days per month on average), with majority of other days being partly cloudy with minimal risk of overcast days. This confirms the solar resource at the site is high quality with long and reliable periods of solar radiation occurring throughout the year.

There are no permanent atmospheric emission sources at the Project site itself; however, there are potential emission sources in the vicinity such as wells, remote manifold stations, among other oil and gas infrastructure that are located outside of the area of influence of the Project site. Air quality monitoring results are on average below the applicable international and Omani standards. Minor short-term exceedances for some parameters (O_3, TVOC and H_2S) were observed in the data, but these did not result in any non-compliance with the applicable averaging periods for each parameter regulated in the standards.

Ambient noise measurements were below the international and national threshold for industrial sites (70 dB) throughout the 24 hr-period. Noise detected on site should be mainly attributed to natural sources i.e. wind.

The project is located in the alluvium and gravel plains that occur in central Oman in the washout plain to the south of the Hajar Mountains, as well as the salt domes that occur in the area around the project, the closest of which is at Kibrit, 13 km to the east of the project boundary. No protected geological features are found on the Project site.

The Project is located on calciorthid soils, specifically on a gypsiorthids group. Surface soil at the project site is silty sand with gravel down to around 20 – 30 cm below ground level, which becomes increasing more compacted and cemented from 0.3 m – 5 m to form weak to moderately strong siltstone or mudstone, with a significant gypsum content in many places. The 2022 geotechnical report recommends that foundations are installed at a minimum of 50 cm below lowest ground level and engineering fill is placed at least 50 cm beneath raft foundations. Surface soils are deflated, i.e. wind erosion has removed fine particles, leaving a layer of protective gravel at the surface. Deflated soils are easily disturbed and require many years of exposure to return to a natural equilibrium with the prevailing wind conditions, and

until equilibrium is re-established disturbed soil will continue to generate more dust than surrounding undisturbed soil during wind conditions. No soil contamination was detected.

The project will not draw directly on groundwater, but its water demands during construction and operational phases will be supplied from desalinated Dammam-UeR groundwater supplied by third parties. Aquifers in the project area include shallow freshwater lenses contain in alluvium, as well as the Umm er Radhuma (UeR). The wells at Abu Thaylah, which is located in the social AOI but outside the hydrology AOI, probably tap shallow freshwater lenses associated with local wadi systems (tributaries to Wadi Umayri). The UeR is a laterally extensive and probably continuous formation throughout the area. The upper UeR is a laterally extensive aquiclude, with an average thickness of 125 m, which isolates the upper groundwater from useable groundwater below.

The project site is located in the lower alluvial terraces of Oman's Northern Interior Plain which discharges to the Eastern Pediplain to the south (MAFWR, 1990 cited in Workey Consultants, 2024). The site's contributing or nearby catchments slope from the north to the south, and are characterized by shallow wadis, sometimes braided wadi flow paths and flow confluences between catchments. A major wadi flow path runs northeast to the south of the site, generating runoff which flows towards and discharges within the east and southeast corner of the site.

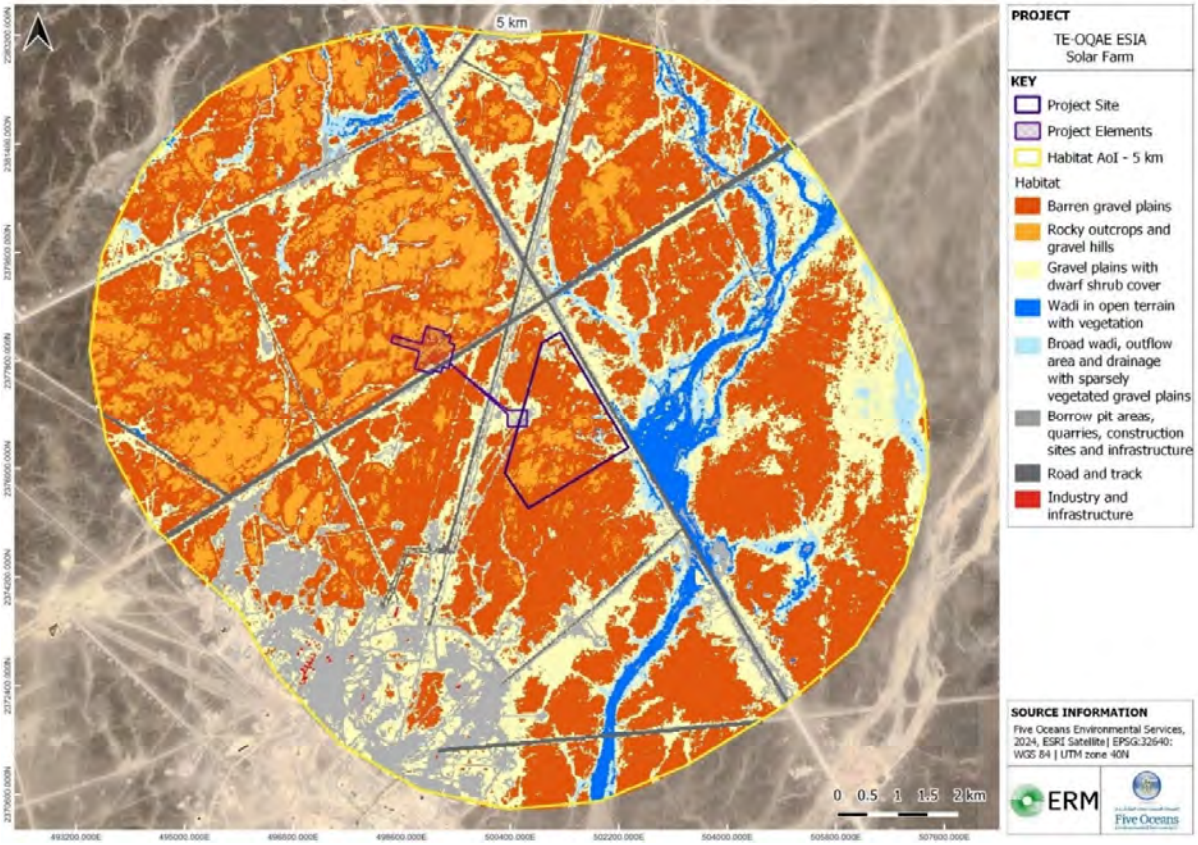
The landscape character area (LCA) for the Project site can be defined as 'Undeveloped Barren Desert Plain' category. This LCA is generally undeveloped and undisturbed area with a predominately flat topography that is absent of any distinct character or features. The Project site does not sit within any national landscape designation.

0.6.2 TERRESTRIAL ECOLOGY

The Project site is not located in or near a National Nature Reserve (NNR) or other level of protection or interest that would indicate that the site has specific conservation value. The closest Natural Reserve to the Project site is Jebal Akhdar National Scenic Reserve, 200 km to the north. The nearest IBA to the Project site is the Jiddat Al Harasis, whose nearest point is around 60 km to the south of the Project site. Other IBAs, such as Jebal Akhdar IBA and Bar Al Hikman IBA, are +180 km and +140 km to the north and south east of the Project site. In addition, there are no World Heritage Sites, or Alliance for Zero Extinction sites within a 50 km radius of the project site.

The distribution of habitats in the 5 km AOI is presented in Figure 0.3 and of the five habitat types in the area of influence, the two dominant habitat types found on the Project site, barren gravel plains and rocky outcrops and gravel hills.

FIGURE 0.3 HABITAT MAPPING OF THE PROJECT AOI FOR TERRESTRIAL ECOLOGY (5KM)



Note: The map above also includes the associated facilities of i) connection from the North Oman Solar Farm with the PDO sub-station, and ii) the substation that will feed the 132 kV OHL to evacuate power to the sub-station in Saih Nihaydah. Source: ERM & 5OES, 2024

A CHA has been prepared and is specifically intended to address the requirements of *IFC Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources* ("IFC PS6"). IFC PS6 requires that projects identify the presence and extent of ***modified, natural and/or critical habitat*** (as defined by the standard) in the Project's Area of Influence.

The CHA screening study for North Oman Solar PV Project therefore concluded that no critical habitats are found on site.

The floral community observed on site is consistent with Ghazanfar's (2003) description of the dominant vegetation unit in Oman's central desert: *Vachellia* (*Acacia*) - *Tetraena* (*Zygophyllum*) *Heliotropium*. However, at the Project site only one individual example of *Prosopis cineraria* were observed, and *Vachellia sp.* and *Prosopis cineraria* were observed in wadi channels in surrounding areas.

The vegetation cover on site is very low, with large expanses of barren gravel plain dominant or predominant, with the majority of the floral community being restricted to drainage channels, most of which are in the south of the plot. Habitats on site are therefore considered of low value, but do provide some value for camel grazing.

No invasive plant species were observed on site. However, Prosopis juliflora was observed including at locations close to the project site such as a PDO Qarn Alam and on the road side near the site (4.5 km to the SE of the site).

The terrestrial fauna expected to occur in the AOI includes ungulates, reptiles and nocturnal small mammals typical of desert/semi-desert habitats. Only one species of lizard has been observed on site to date: Carter's Rock Gecko, *Pristurus carteri*, an Arabian endemic with a wide distribution in Arabia (more than 1 M km^2). This species is ubiquitous in natural habitats in Oman and is listed by IUCN as being of least concern.

Based on expert opinion, Arabian Fox (*Vulpes vulpes arabica*), Arabian Gazelle (*Gazella cora*), and Cape Hare (*Lepus capensis*) are the larger mammalian wildlife species that are most likely to occur on the Project site. No mammal species of conservation concern are listed in the project specific IBAT report nor observed at the Project site. However, all mammalian wildlife species in Oman come under the protection of Royal Decree 114/2001. Signs of camels were also evident on site, including recent footprints, droppings and bones, and camera trapping evidence suggests that camels are indeed present on site frequently (10 days of the 49-day camera trapping effort, around 20% of the time).

It is expected that the abundance and diversity of resident species on site will remain low throughout the year. However, the presence of water bodies is expected to attract migrating water birds in the migration periods (September - November and February - May) and these species may pass through the project site on their way to stopover points along their migratory route. The direction of the migration in Autumn is in a southerly direction, and during the Spring migration season it is generally northward. Since the central deserts are relatively flat and homogenous without significant topographical features, the migration occurs over a broad front and is not focused along well defined routes.

To date no species of bird of conservation concern have been observed at the Project site. The Greater Flamingo *Phoenicopterus roseus,* has been recorded in a groundwater reservoir in the Bird AOI (25 km), which is listed in Appendix II of RD 114/2001.

0.6.3 SOCIOECONOMICS

The Project's socioeconomic context revolves around oil and gas concession areas, specifically Block 6, located in central and southern Oman and operated by PDO. The Project site is undeveloped, with no permanent structures or utilities. The areas surrounding the Project site have been modified and disturbed by extensive PDO activities relating to hydrocarbon production.

While the oil and gas industry operate across these regions, its contribution to local employment is limited. The industry primarily supports the local economy through the procurement of services from local businesses rather than direct employment.

The North Oman Solar PV AoI (15 km around the Project site) in the Ad Dakhiliyah Governorate, specifically in the Wilayat of Adam.

There are no settlements, residential areas, or accommodation camps within 5 km of the Project site. Even in the areas extending up to 15 km (the defined social AoI), the population remains sparse. Abu Thaylah, located 14.9 km away from the Project site, is the closest actively inhabited settlement to the Project site. This is a small settlement of around 14 houses and around nine agricultural compounds. According to the 2020 census data, the total

estimated population in the settlement of Abu Thaylah was of 161 inhabitants, 43 percent of which were non-Omanis. This percentage reflects a larger portion of foreign population than the Wilayat level.

Some tribes living within 50 km of the Project site maintain a distinctive culture, lifestyle, and language. The Al Durai tribe dominate the population around Qarn Alam, and the village of Abu Thaylah is an Al Durai settlement.

The livelihood and income-generating activities in the Project's social AoI and areas beyond, include:

- **Small Businesses**: Small business ownership is an important source of income, with activities ranging from retail and tailoring to restaurants.
- **Employment in Public and Private Sectors**: Employment opportunities in both the public and private sectors are key income sources.
- **Agriculture and Livestock Husbandry**: Some households rely on animal husbandry, particularly the raising and selling of camels. Livestock not only provides income and sustenance but also holds significant social and cultural importance, especially camels and goats.

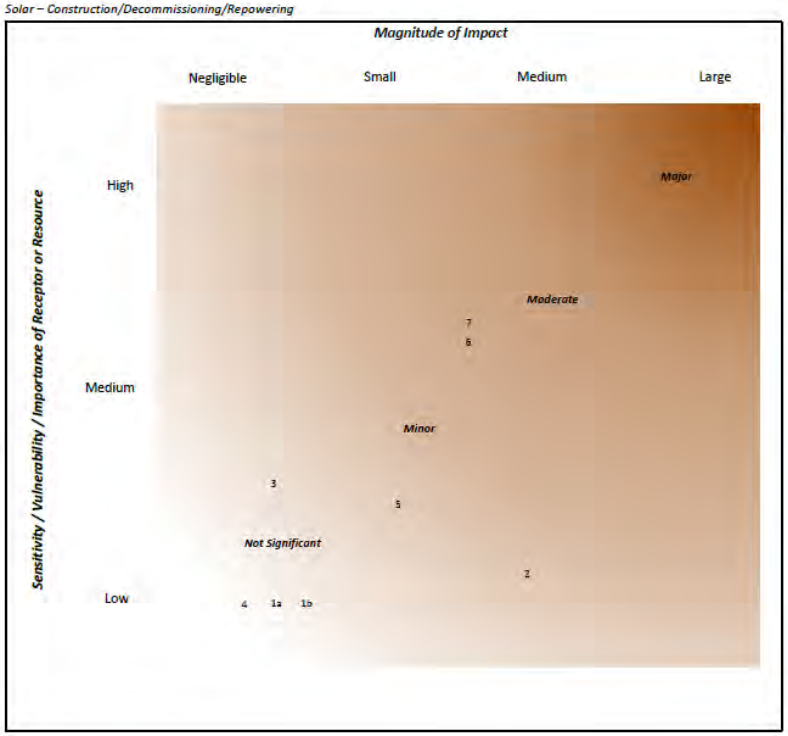
Traditionally, surrounding communities have used the Project site and the surrounding Concession Area for pastoral grazing, with herders traveling long distances to bring their animals when conditions are favorable. Livestock graze and browse extensively over the desert rangelands including in the more vegetated wadis adjacent to and within the Project site. Depending on how much rain falls in any particular year, livestock generally require supplementary feeding with concentrate or fresh feed, both of which represent a significant direct cost to the owner. Engagement with the Wali of Adam's office on 14 July 2024 confirmed that residents of Thaylah graze in the area of the Project site.

0.7 IMPACT ASSESSMENT AND MITIGATION MEASURES

Visual summaries of the results of the impact assessment (i.e. the significance of the potential residual impacts after mitigation and management measures have been implemented) have been prepared in Figure 0.4

FIGURE 0.4 SUMMARY OF RESIDUAL IMPACTS FOR NORTH OMAN SOLAR PV CONSTRUCTION

Solar – Construction/Decommissioning/Repowering

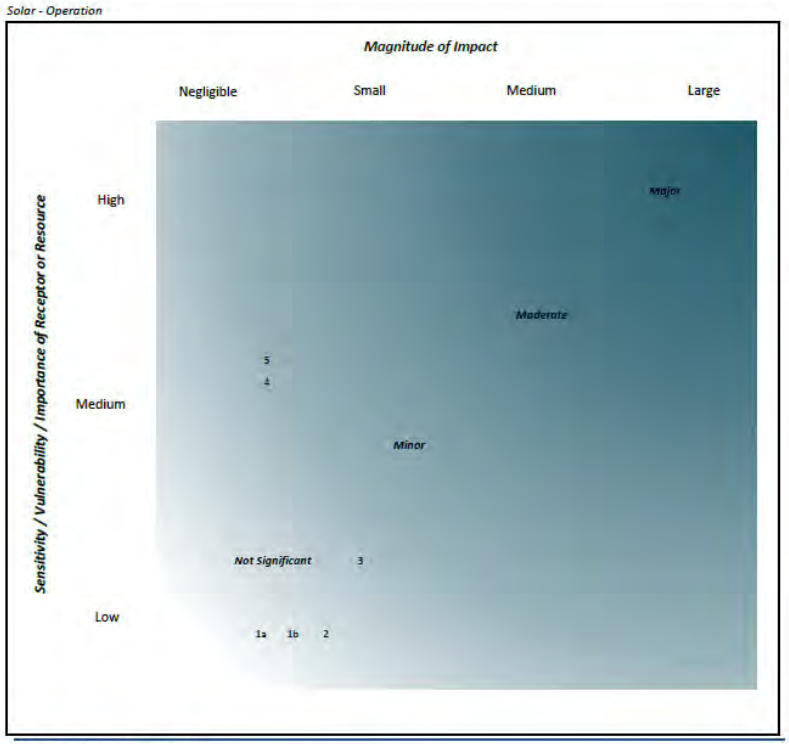


Impact significance	Definition
Not significant	A resource/receptor (including people) will not be affected by a particular activity, or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.
Minor	A resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small (with mitigation) and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude will be well within applicable standards.
Moderate	Has an impact magnitude that is within applicable standards but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit.
Major	An accepted limit or standard may be exceeded, or large magnitude impacts occur to valued/sensitive resource/receptors.

ID	Receptor	Impact
1a.	Geology and soils	Increase of soil compaction and decrease of soil quality
1b.	Geology and soils	Minor spills/leaks
2.	Surface water	Changes to drainage and surface water flows during construction
3.	Air Quality	Dust from construction activities and emissions from construction related traffic
4.	Terrestrial habitats, flora, and fauna	Site Clearance Resulting in Loss and Fragmentation of Habitats
5.	Public infrastructure and services	Increased traffic volume
6.	Community health and safety	Increased incidence of communicable or infectious diseases
7.	Labour and Working Conditions	Impacts associated to labour rights and working conditions

Note: Impacts pre-mitigation assessed in the ESIA as "not significant" have not been reported in the heatmaps.

FIGURE 0.5 SUMMARY OF RESIDUAL IMPACTS FOR SOLAR PV OPERATION



ID	Receptor	Impact
1a.	Geology and soils	Increase of soil compaction and decrease of soil quality
1b.	Geology and soils	Minor spills/leaks
2.	Surface water and groundwater	Changes to drainage and surface water flows during operation
3	Public infrastructure and services	Increased traffic volume
4.	Community health and safety	Increased incidence of communicable or infectious diseases
5	Labour and Working Conditions	Impacts associated to labour rights and working conditions

Note: Impacts pre-mitigation assessed in the ESIA as "not significant" have not been reported in the heatmaps.

Impact significance	Definition
Not Significant	A resource/receptor (including people) will not be affected by a particular activity, or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.
Minor	A resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small (with mitigation) and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude will be well within applicable standards.
Moderate	Has an impact magnitude that is within applicable standards but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit.
Major	An accepted limit or standard may be exceeded, or large magnitude impacts occur to valued/sensitive resource/receptors

0.8 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING FRAMEWORK

The Framework Environmental and Social Management and Monitoring (ESMM) Framework which in an integral component of the ESIA Report, provides a reference point and scope for the development of a detailed Project's Environmental and Social Management and Monitoring Plan (ESMMMP).

The ESMM framework, and subsequent ESMMP, provides the structure to enable environmental and social (including community health and safety) risks to be identified and assessed throughout construction and operation, and mitigation measures to be developed, implemented and appropriately managed. The ESMM framework will therefore assist TTE/OQAE to comply with relevant authorizations, legal requirements, and International Project Standards in a systematic and structured way.

The ESMM framework has been developed to demonstrate how the Project intends to fulfil the requirements of the IFC PS 1, as well as the required management, mitigation and monitoring measures as identified in the ESIA, the IFC General Environmental, Health, and Safety Guidelines, and other relevant IFC Performance Standards, the Equator Principles 4 and a selection of TTE's EHS requirements which will be implemented for the Project and integrated with the Project-specific ESMMP. It has also been developed to integrate the EA's permit conditions (EA, October 2024). It is noteworthy that there was an initial set of permit conditions issued by EA in July 2024 after the approval of the Local ESIA A; however, some of these were discussed due to potential inapplicability, between the Project Proponent and EA on 23rd September 2024; being the final version of these permit conditions issued in 17th October 2024. Appendix B includes a copy of the EA's Local Environmental Permit and final permit conditions.

Furthermore, the ESMP provides outlines of specific management plans that will be detailed and operational prior to the starting of the activities, in order to address potential environmental and social impacts. In addition, TTE/OQAE will implement a Design Change Management procedure, in order to identify gaps and uncertainties and to take them into account when they arise. The objective of the procedure is to ensure that the impacts of change are identified and assessed prior to changes being implemented, and are adequately managed once implemented.

Based on the impact assessment, in addition to the ESMMP, the following specific management plans will be developed for the Project, following the ESIA stage:

- Traffic Management Plan;
- Pollution Prevention and Control Plan;
- Waste Management Plan;
- Hazardous materials management plan;
- Water and Wastewater Management Plan;
- Climate Change Risk Management Plan;
- Stakeholder Engagement Plan including community grievance mechanism (already prepared, to be further updated as the Project progresses);
- Human Resources Policy;
- Local content plan and Local Procurement Policy;

- Workers' Management Plan, including Workers' Code of Conduct and Camp Management Procedure;
- Occupational Health and Safety Plan;
- Community Health and Safety Management Plan;
- Emergency Preparedness and Response Plan; and
- Decommissioning Management Plan.

Environmental, social and health management and monitoring activities will be carried out during the whole life of the Project. The basis and guidelines for monitoring activities shall be defined at the CEMMP and OEMMP at every stage of the Project cycle and will aim to provide reference to evaluate the effectiveness of the implementation of environmental management plans and any needs for improvements in these plans, in an effort to minimize the significant negative impacts.

1 INTRODUCTION

1.1 BACKGROUND

TotalEnergies Renewables Development Middle East LLC (TTE), together with OQ Alternative Energy LLC (OQAE), both being the "Project Proponent" or "Project Company", are developing the proposed North Oman Solar PV Project to be located in the province (wilayat) of Adam, Governorate of Al Dakhiliyah, Sultanate of Oman, hereafter referred to as the Project (Figure 1.1). TTE and OQAE will create a joint venture (JV) company to be registered in Oman (currently unnamed), which will be responsible for the development of this Project.

The Project will consist of an onshore Solar PV plant of 218,805 PV modules of 585 Wp capacity each (though other option of 206,460 PV modules of 620 Wp capacity each is being managed), with a total installed capacity of 105 MW. Other project components will include an underground cabling network, a step-up substation, an internal road network, meteorological stations, and associated construction and operation facilities. Generated electricity from the Solar PV Plant will be evacuated to the grid of Petroleum Development Oman LLC (PDO, the "Off-taker"). Therefore, power evacuation from the Project's step-up substation to the existing PDO's Saih Nihayda Depletion Compression substation will require a 132 kV interface yard and a transmission line of about 5 km long. Power evacuation components are not part of the Project' scope, but are considered associated facilities; their design, construction, operation, and decommissioning will be carried out by PDO as a separate transmission project, with the corresponding environmental assessment and permitting process.

FIGURE 1.1 PROJECT LOCATION

The current document corresponds to the International Environmental and Social Impact Assessment Report ("ESIA B") for the Project. This report has been prepared for TotalEnergies and OQAE (both the Client) by Environmental Resources Management (ERM) and its locally based partner Five Oceans Environmental Services (5OES). ESIA B is focused on meeting international standards for potential international financing and permit conditions issued by the Environmental Authority (EA) in October 2024 as a result of the local ESIA approval.

It is noteworthy that the local ESIA compliant with Omani Regulations ("ESIA A") was prepared by 5OES, taking into consideration the Scoping Report's requirements (Appendix A). ESIA A was approved by Oman's Environmental Authority (EA) in July 2024, which means that the key local environmental permit has been obtained for the Project. Appendix B includes a copy of the EA's Local Environmental Permit and permit conditions. It is noteworthy that there was an initial set of permit conditions issued by EA in July 2024 after the approval of the Local ESIA A; however, some of these were discussed due to potential inapplicability, between the Project Proponent and EA on 23rd September 2024; being the final version of these permit conditions issued in 17th October 2024. Appendix B includes a copy of the EA's Local Environmental Permit and final permit conditions.

In addition, it should be noted that ESIA B will be subsequently updated by ERM/5OES (under the name of "ESIA C"), incorporating the results of the social disclosure events.

1.2 PURPOSE OF REPORT

As mentioned before, this report is the International Environmental and Social Impact Assessment Report ("ESIA B") for the Project and has been produced due to potential lenders' involvement. Therefore, ESIA A is being upgraded/supplemented to comply with international good practice including the International Finance Corporation (IFC) Performance Standards (PS), the Equator Principles (EPs), the World Bank Group's (WBG) Environmental and Social Guidelines, as well as with relevant TotalEnergies' Environmental and Social (E&S) corporate standards.

The purpose of the ESIA process is to identify and manage the non-technical risks and opportunities of a project that emerge from interactions with the physical, biological or socioeconomic environments and stakeholders (such as regulatory authorities or local communities).

As mentioned before, the local ESIA (ESIA A) was previously prepared by 5OES and was approved by Oman's EA in July 2024 following the national Environmental Impact Assessment process established in Royal Decree 114/2001 "The Law on the Conservation of the Environment and Pollution Prevention" and EA Decision 107/2023 (further amended by EA Decision 152/2023) "Issuing the Regulation Governing the Issuance of Environmental Permits".

Therefore, the current ESIA report (ESIA B) will complement ESIA A to meet internationally recognized standards used to manage environmental, social, and health and safety impacts, risks, and opportunities, together with TotalEnergies' E&S corporate standards.

1.3 THE DEVELOPER

For the specific Project, the Proponent is the TTE and OQAE JV partnership. A project specific company is in the process of being registered with the Ministry of Commerce, Industry and

Investment Promotion (MCIIP) to form a standalone Independent Power Producer (IPP) company which will be registered as a limited liability company (LLC) under the laws of the Sultanate of Oman, and the assets will be developed on a build, own and operate (BOO) basis. The share capital of the Project Company will be owned jointly by TTE and OQAE. While this process is completed, local permit application will be applied for by OQAE, and transferred to the new commercial entity when its commercial registration process has been completed. Commercial local and international banks are planned to be the financing parties for the Project.

TotalEnergies is a global integrated energy company, founded in 1924 and active in about 120 countries, that produces and markets energies: oil and biofuels, natural gas and green gases, renewables, and electricity. TotalEnergies' global ambition is to achieve carbon neutrality by 2050, together with society[1]. In addition, the Company's objective is to produce more than 100 TWh/year by 2030, which would place it among the world's top five producers of renewable electricity (wind and solar), creating value through integration along the electricity chain. TotalEnergies' integration extends to end-customer sales, with offers tailored to both private and business customers. By 2030, the Company aims to supply almost 10 million customers and sell 130 TWh. For its industrial customers, TotalEnergies offers long-term purchase contracts from its solar and wind farms, as well as distributed solar generation solutions[2].

In Oman, TotalEnergies currently produce oil in Block 6 (4%), as well as LNG through their participation in the Oman LNG (5.54%)/Qalhat LNG (2.04% via Oman LNG) liquefaction complex with an overall capacity of 11.4 Mt/y. In 2021, TTE signed a concession agreement to develop natural gas resources on onshore Block 10 (26.55%), and in 2022 they signed an exploration and production sharing contract for Block 11 (22.5%). They also operate exploration Block 12 (80%). In 2024, they signed the Final Investment Decision (FID) for the Marsa LNG project in joint venture with OQ, the national oil company (TotalEnergies 80%, OQ 20%).

OQ is a global integrated energy company with roots in Oman and headquartered in Muscat. OQ has operations across 17 countries that covers the entire value chain from exploration and production of oil and gas, refineries and petrochemicals to marketing and distribution of end-user products reaching more than 80 countries worldwide[3]. OQ's interest is maximizing value from Oman's energy resources and powering Oman's transition towards a sustainable future. In that sense, OQ's Alternative Energy (OQAE) business unit is the cornerstone of OQ's position as a leading sustainable integrated energy company and a new avenue for sustained, long-term growth[4]. OQAE is considered fundamental to realizing OQ vision of building a locally and globally integrated energy company, focusing on investments in renewables and green hydrogen in Oman.

Contact details for the Project Proponent are provided below:

Company:	**TotalEnergies (TTE)**
Contact:	Mohamed Tarig
Position:	Project Developer

[1] https://totalenergies.com/company/transforming/ambition/net-zero-2050
[2] https://totalenergies.com/company/transforming/multi-energy-offer/low-carbon-electricity
[3] https://oq.com/en/about-oq/about-oq
[4] https://oq.com/en/business-units/alternative-energy

Address:	Ubora Commercial Tower, 38th floor – Office 3803, Business Bay, P.O. Box 14871, Dubai – UAE
Email:	mohamed.tarig@totalenergies.com
Company:	**OQ Alternative Energy (OQAE)**
Contact:	Al Moatasem Al Ismaili
Position:	Project Developer
Address:	Muscat Grand Mall, PO Box 261, PC 118, Dohat Al Adab street, Muscat - Oman
Email:	almoatasem.alismaili@oq.com

1.4 THE ESIA TEAM

The core ESIA team members involved in this ESIA are listed in Table 1.1.

TABLE 1.1 THE ESIA TEAM

Name	Role	Qualifications, Experience
Ms Cristina Ortuño	Project Director (ERM)	MSc Forestry Engineering, 20 years
Ms Caroline Secretin	Project Manager (ERM)	MSc Environmental Science, 14 years
Mr Simon Wilson	Project Manager (5OES)	BSs Zoology, MSc Coastal Management, PhD in Marine Ecology, 28 years
Mr Owen Davies	International Biodiversity Lead (ERM)	BSs Botany and Zoology, PhD Zoology, 10 years
Ms Iulia Luta	International Social & Stakeholder Engagement Lead (ERM)	MSc Analytical Control of Environmental Quality and Clean-up Techniques, 18 years
Ms Dalal Darwish	Local Social & Stakeholder Engagement Lead (5OES)	BSs Biology, 20 years
Ms Marina d'Engelbronner	International Human Rights Lead (ERM)	PhD Law, 30 years
Ms Christie HazellMarshall	International Air Quality Lead (ERM)	BSs Environmental Risk Management, PhD Air Pollution and Cardiovascular Health Effects, 27 years
Mr George Chatzigiannidis	International Acoustics Lead (ERM)	MSc Acoustical Engineering, 12 years
Mr Pralabh Bhargava	International Climate Change Lead (ERM)	BSs Commerce, MBA Finance, 15 years

Contact details for the ESIA consultancy are provided below:

Consultancy: **Environmental Resources Management Iberia SAU (ERM)**

Contact: Cristina Ortuño

Position: Project's Partner in Charge

Address: Paseo de la Castellana 257, 2da Planta, 28046, Madrid – Spain

Email: cristina.ortuno@erm.com

Consultancy: **Five Oceans Environmental Services LCC**

Contact: Simon Wilson

Position: Project Manager

Address: PO Box 660, PC 131, Muscat, Sultanate of Oman

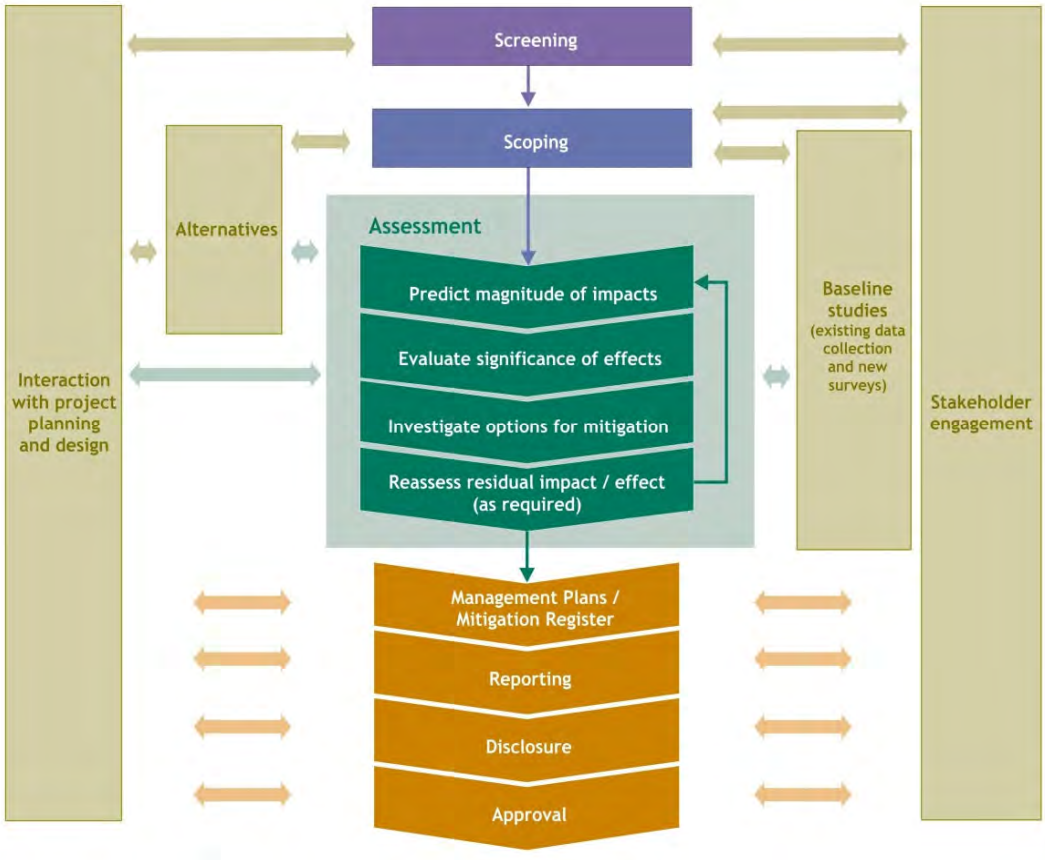
Email: simon.wilson@5oes.com

1.5 ESIA PROCESS

The ESIA process predicts and evaluates any likely significant effects of a project on the receiving environment and identifies measures to avoid, reduce, remedy, offset or compensate for adverse impacts and, to provide benefits, to the extent these are reasonably practicable.

The ESIA process undertaken for the Project is shown in Figure 1.2.

FIGURE 1.2 ESIA PROCESS



Source: ERM, 2024.

The initial screening of the Project against applicable local laws and regulations and the IFC PS indicated that the Project might pose environmental or social risks that need to be further assessed through the additional steps of the ESIA process, as per IFC guidance[1].

Subsequently, a scoping exercise was completed for the Project between 5OES and the Project Company (OQAE). Scoping has an important role to play in achieving a proportionate and effective ESIA by focusing subsequent work on the significant issues. A Scoping Report was prepared for the Project by 5OES, and the final version was approved by Oman's EA in March 2024. Additional assessments to be addressed in the Local ESIA (ESIA A) were requested by EA as part of the approving conditions of the Scoping Report (Appendix A).

The Scoping Report presented the results of the initial baseline desk studies and used the evidence base to justify proposed approaches to ESIA A (local) and ESIA B/C (international),

[1] IFC Guidance Note 1 Assessment and Management of Environmental and Social Risks and Impacts, January 1, 2012.

the levels of detail for different topics, a summary of the potential key environmental and social issues/impacts associated with the construction, operation and decommissioning of the Project (i.e. the scope of the assessment), and arguments for scoping certain matters out, if they reasonably could be.

It is noteworthy that the Scoping Report was based mainly on bibliographical information on the project area, with very limited field data. Now that fieldwork surveys have been undertaken on site, there is a clearer understanding of the actual situation in the Project area, and, therefore, some aspects initially scoped-in are now considered as scoped-out. In this sense, ERM/5OES has included a summary table in Section 7.3 of this ESIA, showing clearly potential deviations between the Scoping Report terms of reference, the ESIA A, B/C and clear justifications for any aspects that have been scoped out due to a better understanding of the project context.

1.6 ESIA STRUCTURE

This report is structured as follows:

- Executive Summary
- Chapter 1 - Introduction
- Chapter 2 - Legislation and Standards
- Chapter 3 - Project Description
- Chapter 4 - Assessment of Alternatives
- Chapter 5 - Stakeholder Engagement
- Chapter 6 - Baseline Conditions
- Chapter 7 - Impact Assessment
- Chapter 8 - Environmental & Social Management and Monitoring
- Chapter 9 - References

This report is supported by the following appendices:

- Appendix A - Scoping Report and Related Documentation
- Appendix B - EA's Local Environmental Permit and Conditions (in response to ESIA A)
- Appendix C - Project's Applicable Legal Framework
- Appendix D – Climate Change Risk Assessment (CRRA)
- Appendix E – Design Change Management Procedure (DCMP)
- Appendix F - Stakeholder Engagement Plan (SEP)
- Appendix G - Laboratory Analytical Results
- Appendix H - Screening Critical Habitat Assessment (CHA)
- Appendix I – Landscape Photomontages
- Appendix J - EXECUTIVE SUMMARY OF THE HUMAN RIGHTS RISK ASSESSMENT (HRRA)

2 LEGISLATION AND STANDARDS

2.1 OVERVIEW

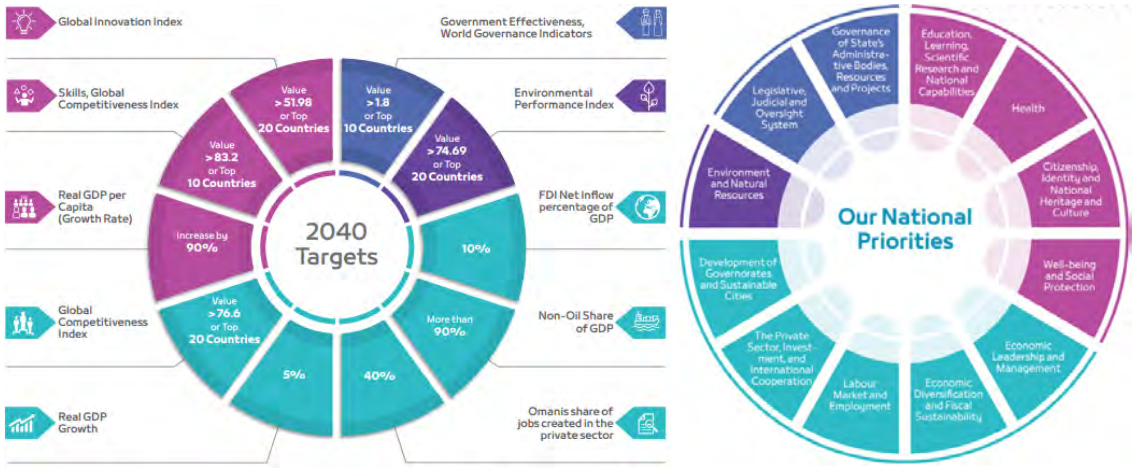
This section sets out the regulatory and administrative framework for the Project. It describes the Omani laws and regulations that are relevant to the development of the Project, including Permit conditions issued by the Environmental Authority (EA) in July 2024 as a result of the local ESIA A approval. It also describes the international industry standards and Environmental, Health and Safety (EHS) standards that the Project has adopted.

2.2 RELEVANT OMANI DEVELOPMENT PLANS AND STRATEGIES

2.2.1 OMAN VISION 2040

Oman Vision 2040 launched in December 2020 provides national targets and priorities (Figure 2.1) that shape the country's regulatory and administrative framework. It also provides the goals for shaping of roles and relationships between the public, private, and civil sectors to ensure effective economic management; a diversified and sustainable national economy; fair distribution of development gains among governorates; and protection of the nation's natural resources and unique environment.

FIGURE 2.1 OMAN VISION 2040 AND NATIONAL PRIORITIES



Source: Oman Vision 2040, 2020.

2.2.2 SECOND NATIONALLY DETERMINED CONTRIBUTION (2021)

The Government Carbon Control Target Plan, aligned with Oman Vision 2040 and the National Energy Strategy, aims to facilitate a gradual shift towards a low carbon economy and a significantly reduced carbon emissions energy matrix by 2030. The plan focuses on the extensive adoption of renewable energy and implementing energy efficiency measures as the core pillars to achieve carbon control goals in the country. Oman has engaged through its Nationally Determined Contribution (NDC) to reduce its absolute greenhouse gas (GHG) emission by 2% by the year 2030.

2.2.3 OMAN NATIONAL STRATEGY FOR AN ORDERLY TRANSITION TO NET ZERO (2022)

The strategy aims to achieve carbon neutrality by 2050 and reduce the overall carbon budget. The strategy involves a gradual approach, prioritizing cost-effective decarbonization measures and employing six main technologies (namely energy and resource efficiency, electrification and renewables, battery electric technology, sustainable hydrogen, carbon capture and storage and negative-emission solutions) to address around 90% of emissions reduction. The remaining gap will be bridged through breakthroughs, natural negative emissions, and behavioral changes. Successful implementation requires technological maturity, new infrastructure, supportive policies, and market mechanisms. To ensure success, Oman must balance long-term planning with near-term actions and integrate key strategies across various sectors. The Oman Sustainability Center established through Royal Decree 30/2015 will be responsible for governance, progress tracking, stakeholder engagement, and investment planning. The strategy emphasizes aligning policies, legislation, and regulations at different levels to translate national targets into actionable policies and close any regulatory gaps.

2.3 POLITICAL AND ADMINISTRATIVE FRAMEWORK

There are three levels of Government within the Sultanate of Oman: Central, Regional (or Governorate) and Wilayat (or province).

2.3.1 CENTRAL GOVERNMENT

His Majesty Sultan Haitham bin Tariq Al 'Sa'id is the Head of State and the Head of Government. His Majesty appoints a Cabinet of Ministers. He presides over the Council of Oman (Majlis Oman), which comprises the Council of State (Majlis ad Dawla), and the Consultative Assembly (Majlis Al Shura).

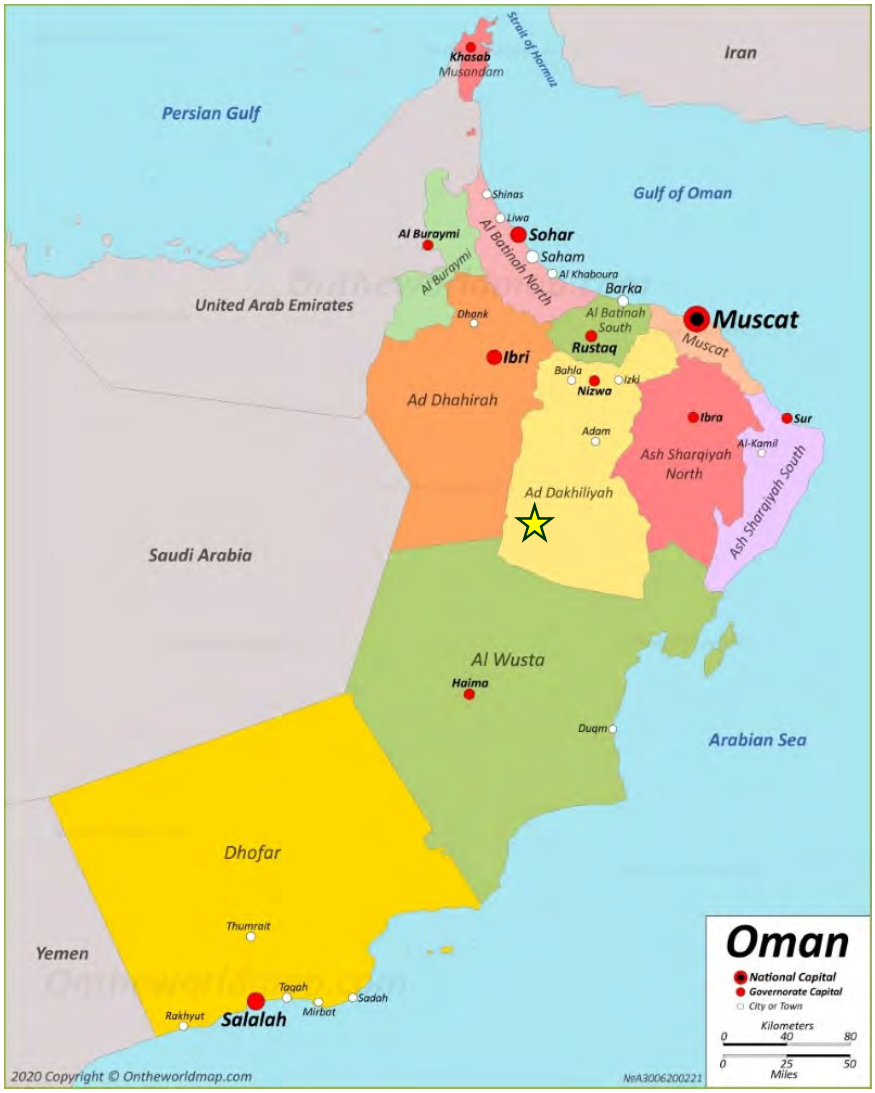
The Consultative Assembly has 83 elected members (Shura Members) drawn from Oman's 61 wilayats. The Assembly serves as a conduit of information between the people and the government ministries. It is empowered to review drafts of economic and social legislation prepared by service ministries, and to provide recommendations. It has no authority in foreign affairs, defense, security, and finances.

National legislation is proposed and drafted through the Government Ministries based in Muscat. All legislation is reviewed and affirmed by the Council of State and the Consultative Assembly and in turn implemented through the actions of the Regions through regional offices, which may be present in larger Wilayat Centres to represent the various Ministries.

2.3.2 GOVERNORATE

Oman is divided into 11 Governorates, which are divided into 61 provinces or wilayats (Figure 2.2). The Project is located in the Governorate of Al Dakhliya.

FIGURE 2.2 OVERVIEW OF THE SULTANATE'S GOVERNORATES



Note: Yellow star represents approximate location of the Project.

Source: Ontheworldmap (https://ontheworldmap.com/oman/).

Over the past 50 years, there has been a rapid growth of regional wealth and concomitant economic development as a result of significant revenues from oil and gas production for Gulf Cooperative Council (GCC) countries. The small populations of GCC countries have led to a strong demand for expat labor into the region during this period of rapid economic growth. In Oman, a relatively high national population growth rate and sustained immigration rates of expat labor have caused rapid population growth, urban development, and relatively intense economic development, much of which is concentrated in coastal areas.

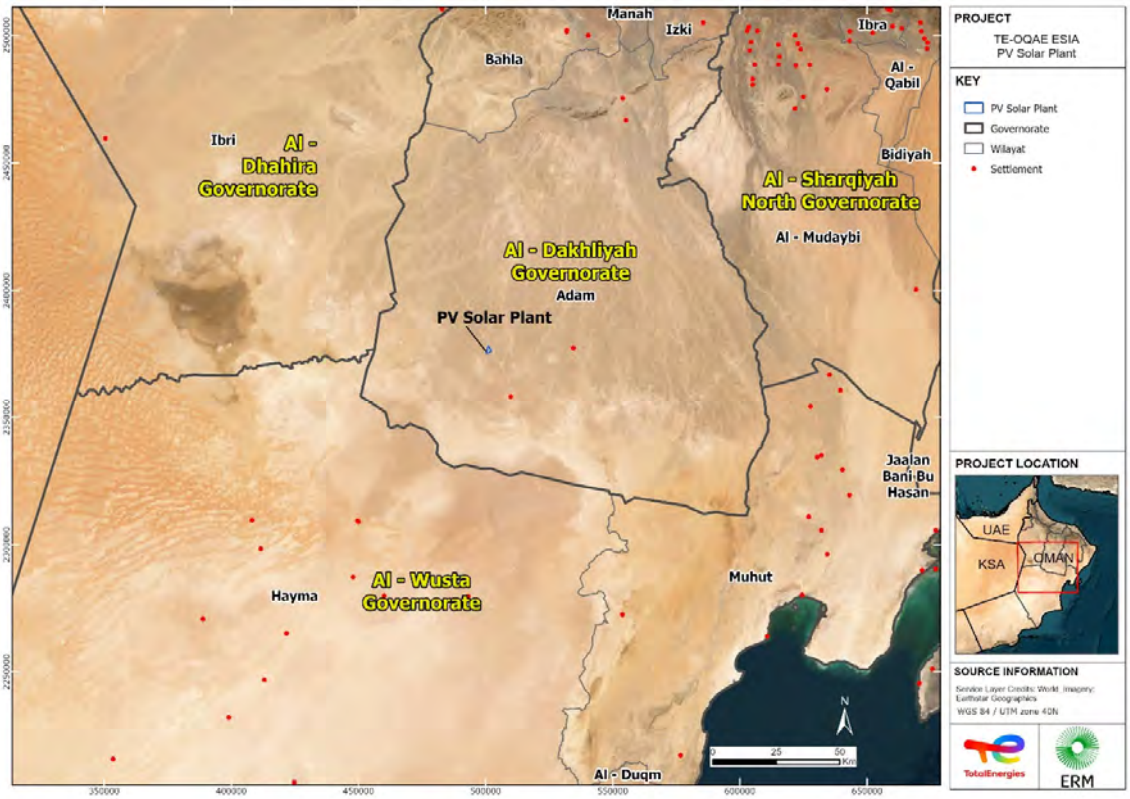
2.3.3 WILAYAT

Each Governorate is made up of wilayat or provinces (sing. wilayah) usually based around a town or large village. Al Dakhliya Governorate consists of nine wilayats: Nizwa, Bahla, Al Hamra, Manah, Adam, Izki, Samail, Bidbid and Al Jabal Al Akhdar, of which the Project is located in Adam. Each Wilayat is led by a Wali and contains a number of settlements that are

represented by sheikhs, who regularly engage directly with the Wali. The main government interface for sheikhs is, therefore, the Wali.

Figure 2.3 shows the location of the Project site along with the administrative boundaries of the Wilayat and Governorate.

FIGURE 2.3 WILAYAT OF ADAM IN DAKHLIYA GOVERNORATE



Note: The red dots generally represent settlements in the Wilayat; however, not all marked red dots represent actual permanent settlements (please refer to the social baseline of this ESIA for further details).

Source: ERM, 2024.

2.4 NATIONAL LEGAL FRAMEWORK

2.4.1 ENVIRONMENTAL AUTHORITY

The Environmental Authority (EA; previously called the Ministry of Environment and Climate Affairs, MECA) was established on the 18th of August 2020 by Royal Decree No. 106/2020. EA is responsible for issuing regulations, standards, and guidelines for the implementation of environmental protection, control, and management laws, as represented in Omani laws (e.g., Royal Decrees, RDs, and Ministerial Decisions, MDs). The Directorate General of Environmental Affairs (DGEA) within EA provides guidelines on how Environmental and Social Impact Assessments (ESIAs) are to be conducted in Oman, and the Environmental Assessment and Permit Centre is mandated with the role of coordinating the ESIA process and issuing preliminary and final environmental permits.

In accordance with RD 114/2001, EA is the main authority responsible for issuing Environmental Permits for developments within Oman (Article 9). EA has the authority to

either reject applications or issue permits, as well as to set conditions for the permits of the Project, according to its potential impacts on the environment. Environmental legislation is in place to help define and guide this authority, in the form of Royal Decrees, Ministerial Decisions and international laws, protocols, agreements and conventions to which the Sultanate is signatory.

The authority preserves environmental integrity and the sustainability of developments through sound efficient environmental management in all sectors. Environmental inspections and programs for environmental control are exercised to monitor environmental conditions during and after projects are implemented, and impacts are minimized to the maximum extent possible. National laws, systems, regulations, decisions, and strategic programs are upheld for the protection of the Omani environment and compliance with the Sultanate's commitments to international environmental agreements. The ministry follows up the implementation, preparation and updating of the national strategy for chemicals management and operates national networks to monitor environmental pollutants in conjunction with managing environmental violations.

2.4.2 ENVIRONMENTAL LEGISLATION

Environmental protection within Oman is primarily governed by the "Law for the Conservation of the Environment and the Prevention of Pollution" (Royal Decree 114/2001) administered by the Environmental Authority (EA; previously called the Ministry of Environment and Climate Affairs, MECA).

For reference, relevant environmental laws are summarized in relation to Project requirements. It includes Royal Decrees (RDs), Ministerial Decisions (MDs) and Administrative Decisions (ADs) relevant to the ESIA permitting process and to environmental compliance. Table 2.1 lists the international agreements and conventions acceded to and in most instances ratified by Royal Decree, which the Project should uphold through the implementation of the requirements of the legislation listed in Table 2.2, and Good International Industry Practice (GIIP).

Further information relating to key RDs and MDs is provided in Appendix C in conjunction with a non-exhaustive list of legislated limits for environmental aspects (e.g. air quality and noise).

TABLE 2.1 ENVIRONMENTAL LAWS AND THEIR RELEVANCE TO THE PROJECT

RD/ MD No.	Legislation Aim	Summarized relevance to Project
Specific to the Onshore Solar Projects		
CAR-139	Civil Aviation Regulation – Aerodrome Certification, Design and Operation	• No light shall be permitted in an aerodrome that in the opinion of Civil Aviation Authority (CAA) may cause glare/dazzle to airport users. • It should be noted that, particularly for the Project, a No Objection Certificate (NOC) has been obtained from CAA, in which the Project Proponent has committed to use anti-reflection panels.
Principles of Environmental Management		
RD 114/2001	Conservation of the environment and	• Conserve resources. • Avoid pollution.

RD/ MD No.	Legislation Aim	Summarized relevance to Project
	prevention of pollution	• Implement environmental management procedures as well as immediate measures to rectify faults (including from emergencies). • Develop a contingency plan for periodically review. • Comply with requirements of Ministerial Decisions issued after RD 114/2001. • Protection of wildlife (including all mammals) and some species and types of bird.
Environmental Approvals and Regulation		
RD 114/2001 MD 48/2017 AD 107/2023 (Amended by AD 152/2023)	Regulation of the issuing of Environmental Permits/Licenses, including fees and fines	• Project proponent to obtain an environmental permit prior to commencing project activities. • An environmental permit will be issued for a max period of 3 years, renewable in the 34th month for another period of 3 years. It must be renewed not more than 30 days before expiration. In the case of this Project, the environmental permit has been issued by EA for a period of 1 year. • Issuance and renewal of environmental permits for a Category A project is OMR 900 per activity relevant to the project. • EA must be notified, prior to commissioning, that environmental requirements for operation are fulfilled and of the proposed commencement of Operation date. • Spills must be reported immediately to the EA and specify the circumstances, type, and quantity of the spillage as well as measures to stop or control the spillage.
MD 209/1995	Fulfilment of environmental permit condition and penalization of violators	• Ensure compliance with the conditions of environmental permits. • Permit violations may result in fines and complete stoppage of Project activity until violation is resolved.
Nature Conservation		
RD 114/2001 RD 67/2002 RD 6/2003 RD 8/2003 MD 110/2007	Protection of ecology and biodiversity	• Do not damage trees. • Avoid damaging shrubs where possible. • Do not kill animals. • Do not introduce non-native species.
MD 128/1993 MD 169/2000 MD 5/2017	Protection of vegetation, in particular the cutting and felling of trees, notably *Prosopis cineraria* (Ghaf)	
RD 21/2017	Animal Welfare law	

RD/ MD No.	Legislation Aim	Summarized relevance to Project
MD 101/2002	Banning the killing or hunting of wild animals and birds	
AD 13/2021	Prohibition of possessing and using tools and devices for hunting, tracking, and imitating the sounds of wild birds and animals	• Affects the use of bird deterrents for managing bird pest species or minimising biodiversity impacts (very low relevance to the project).
Atmospheric Emissions		
MD 118/2004	Relating to atmospheric emissions from stationary sources	• Ensure that atmospheric emissions are compliant with MD 118/2004. • Monitor emissions from stationary sources on a scheduled basis.
MD 20/2016	Regulations for the Management of Climate Affairs	• A permit (valid for 2 years) may be required relating to the emission of greenhouse gases for emissions above 2,000 tpa CO2e. • Issuance and renewal of environmental permits for a Category 1 Projects (listed in MD 2018/20162 Annex B2) activity is OMR 100. • GHG emissions to be recorded and reported to EA. • Landscaping plan to promote carbon sequestration to be submitted to EA. • Low energy consuming and renewable energy technologies to be included in the project design. <u>Based on conversations with EA on September 23, 2024, climate affairs regulations do not apply to renewable energy projects such as this project.</u>
MD 41/2017	Ambient Air Quality Standards	• Carry out ambient air quality monitoring as per the requirements of EA.
MD 107/2013	No use of substances that deplete the ozone layer	• Ensure that the project does not use any substances that are banned or being phased out in accordance with the Montreal Protocol.
MD 107/2018	Relating to Energy Labelling and Energy Performance Requirements	• Ensure that air conditioning equipment brought to site complies with GCC Standard GSO 2530/2016 and is registered according to the Omani Energy Efficiency Ratio System.
Noise		
MD 79/1994 MD 80/1994	Relating to noise emissions in the public and working environments	• Ensure that noise levels beyond a project perimeter fence are <70dB. • Issue PPE as and where necessary.
Climate Affairs		

RD/ MD No.	Legislation Aim	Summarized relevance to Project
MD 20/2016	Minimize impact on climate change	Regulations for the Management of Climate Affairs: • Obtain relevant licenses to emit greenhouse gases. • Collection and reporting of greenhouse gas emissions. • Use of Best available technologies to reduce greenhouse gas emissions. Based on conversations with EA on September 23, 2024, climate affairs regulations do not apply to renewable energy projects such as this project.
MD 117-2013 Guideline/Form 1	Guidelines for the Preparation of Climate Affairs Chapter in the Environmental Impact Assessment Study for the Projects (2017)	• Provides definitions and procedures for submitting a Project inventory of Greenhouse Gas (GHG).
Waste		
MD 17/1993 (Amended by MD 57/2002)	Relating to non-hazardous wastes	• Do not mix non-hazardous with hazardous waste. • Implement a consignment note system.
MD 18/1993 (Amended by MD 10/2017 and MD 56/2002)	Relating to hazardous wastes	• Segregate wastes by type. • Dispose to a registered hazardous waste site or management company. • Use licensed waste transporters only.
EA Decision No. 15/2021 Amended by EA Decision No. 65/2023	Export of waste	• Obtain license to export hazardous and non-hazardous wastes. • Exemption granted for waste that cannot be treated or recycled in Oman. • Do not mix different waste types in a single shipment or container. • Maintain a record detailing the production, sale, and disposal methods of hazardous and non-hazardous waste.
EA Decision No. 51/2023	Import of waste	• Obtain license to import or transit hazardous and non-hazardous wastes into Oman. • Do not mix different waste types in a single shipment or container. • Do not open shipments during transit. • Maintain a record of permitted waste types, quantities, and final product descriptions for import or transit. • Register all data of imported waste in EA system.
Wastewater		
RD 115/2001 MD 145/1993 MD 159/2005 (Amended by MD 12/2017 and MD 55/2002	Relating to wastewater management and discharge	• Dispose of sewage to a Municipality approved sewage treatment plant. • Ensure treated effluent complies with required standard.

RD/ MD No.	Legislation Aim	Summarized relevance to Project
MD 421/1998)		• Ensure septic tank and soak-away designs are compliant with design specifications.
Water use		
RD 29/2000 RD 115/2001 MD 192/2001 MD 195/2001 MD 342/1997 MD 3/2009	Relating to the protection of water resources and use of water supply wells	• Obtain water from an approved source. • Ensure that activities do not threaten the integrity of water resources. • Obtain relevant permissions prior to constructing a water supply well.
Soils and Topography		
MD 200/2000	Relating to quarries and borrow pits	• Obtain approval from the local Municipality to excavate borrow pits.
Heritage and Culture		
RD 35/2019 (Amended by RD 41/2020)	The Law on Cultural Heritage	• Ensure archaeological & cultural heritage sites are not affected by project activities. • Report archaeological and heritage finds and sites to the Ministry of Heritage and Tourism (MHT). • Obtain permission from the MHT before commencing project activities in areas where sites of archaeology and/or cultural heritage are known to be present.
Chemicals and Radioactive Materials		
RD 46/1995MD 25/2009 MD 79/2006AD 50/2023	Relating to the import, distribution, use and disposal, permitting requirements, and storage of chemicals	• Ensure that Project Company and its contractors have relevant permits in place for procurement and use of materials during both construction and operational phases and ensure that the correct facilities are available for their safe storage and management. • Ensure that the project does not use any banned materials and substances.
AD 79/2023	Issuing the Regulation for Radiation Protection and Safety and Security of Radiation and Radioactive Material	• The entry to the Sultanate of radioactive materials, or equipment that contains them shall only be by air and it is prohibited transport them within the country except by land transportation. • Permit to be obtained for the handling and use of radioactive materials. • All radioactive sources should be returned to the manufacturer for disposal.
MD 25/2009	Control of hazardous chemical materials	• Bans the use and circulation of some hazardous chemical materials, including PCBs, brown asbestos, and blue asbestos.
Socioeconomics / Health and Safety		
RD 53/2023	Oman Labor law providing minimum standards and conditions of employment	• Minimum standards and conditions of employment. • Comply with the set Omanisation quotas and plans

RD/ MD No.	Legislation Aim	Summarized relevance to Project
MD 286 / 2008 Amendments: MD 322/2011 MD 133/2018 MD 4/2021	Occupational Health and Safety regulations and provisions for safe working practices and environments	• Occupational Health and Safety regulation of Oman provides minimum working standards and conditions, including provision of personal protective equipment and seasonal working hours.
RD 6/2022 MD 34/2024	Personal Data Protection Law	• Protection of data collected from staff regarding employment details, and social data collected through questionnaires. • Obtain permit from Ministry of Transport, Communications and Information Technology (MTCIT) prior to processing of personal data (genetic data, biometric data, health data, racial or ethnic origin, sexual life, political or religious opinions, beliefs, criminal convictions, or security measures)
RD 40/2014 RD 55/2019 Decision 9/2023	Executive Regulation of the Statistics and Information Law	• Obtaining a statistical license from the National Centre for Statistics and Information (NCSI) prior to conducting any survey or poll (collecting information during grievance redressal process).

TABLE 2.2 LEGISLATION PASSED RATIFYING INTERNATIONAL AGREEMENTS

Reference No.	Title
RD 81/1999	Rotterdam Convention on Prior Informed Consent Practices for Certain Hazardous Chemicals
RD 73/1998 Amendments: RD 106/2004 MD 37/2001	Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer Montreal Protocol prohibiting the use of substances that Deplete the Ozone Layer
RD 67/2002	Agreement of the Conservation of Natural Life and its Natural Habitats in the Gulf Cooperation Council Countries
RD 65/2005	Convention, 1957 (No. 105) on the Abolition of Forced Labor, and the Convention, 1973 (No. 138) on the Minimum Age for Admission to Employment
RD 56/2005	Convention for the Safeguarding of Intangible Cultural Heritage
RD 69/1981	Convention on the protection of the world's culture and natural heritage (UNESCO's world heritage convention)
RD 20/2007	UNESCO Convention on the Protection and Promotion of the Diversity of Cultural Expressions (2005)
RD 42/2005	Convention on the Elimination of all Forms of Discrimination against Women
RD 28/2019	United Nations Framework Convention on Climate Change provides greenhouse-gas-emissions mitigation, adaptation, and finance
RD 25/1981	International Conventions and Multilateral Agreements
RD 119/1994	Basel Convention for Control of Transboundary Movement of Hazardous Wastes and their disposal United Nations Framework Convention on Climate Change United Nations Convention on Biological Diversity

Reference No.	Title
RD 117/2004	Stockholm Convention on Persistent Organic Pollutants (POPs)
RD 107/2004	Kyoto Protocol on Climate Change
RD 5/1996	UN Convention to Combat Desertification
RD 9/1981 RD 102/1984	Chicago Convention on International Civil Aviation

2.4.3 ESIA REGULATORY FRAMEWORK

2.4.3.1 ESIA IN THE CONTEXT OF REGULATORY PERMITTING

The requirement for EIAs in Oman is described in Article 16 of RD 114/2001 (Law on Conservation of the Environment and Prevention of Pollution), which states:

"The owner of any source or area of work which – according to the basis specified by the Ministry – may constitute an avoidable or curable risk to the environment, shall submit, prior to the application for the environmental permit, a detailed EIA study confirming that the benefits of the source or area of work surpass the potential damage to the environment."

Based on the Guidelines for Obtaining Environmental Permits, published by EA Decision 107/2023 (further amended by EA Decision 152/2023) on Regulations for Organizing Environmental Permitting, the Project was classified as "**Category A**" and required an EIA due to the activities listed in Table 2.3. ESIA A has been approved by Oman's EA in July 2024.

TABLE 2.3 ANTICIPATED ACTIVITIES REQUIRING AN EIA UNDER MINISTERIAL DECISION NO. 48/2017

Category A: Activity	No.
Electric power generation	351001
Other activities related to electric power generation, transmission and distribution	351099

2.4.3.2 ESIA PROCESS AND APPROVAL

EA is responsible for issuing regulations, standards, and guidelines for the implementation of environmental protection, control and management laws, as represented in Omani laws.

Oman's Environment Authority Decision No. 107/2023 outlines the environmental permitting process (Table 2.4). Based on this Decision, the Project was classified as a **Category A**, which means that it required an EIA (Local ESIA – ESIA A).

Project activities were identified by EA and included in the Project's commercial registration through the online Oman Invest Portal. ESIA A was submitted to EA for approval in June 2024 in order to allow the Project to commence under the Omani legal framework. ESIA A was then approved by EA in July 2024.

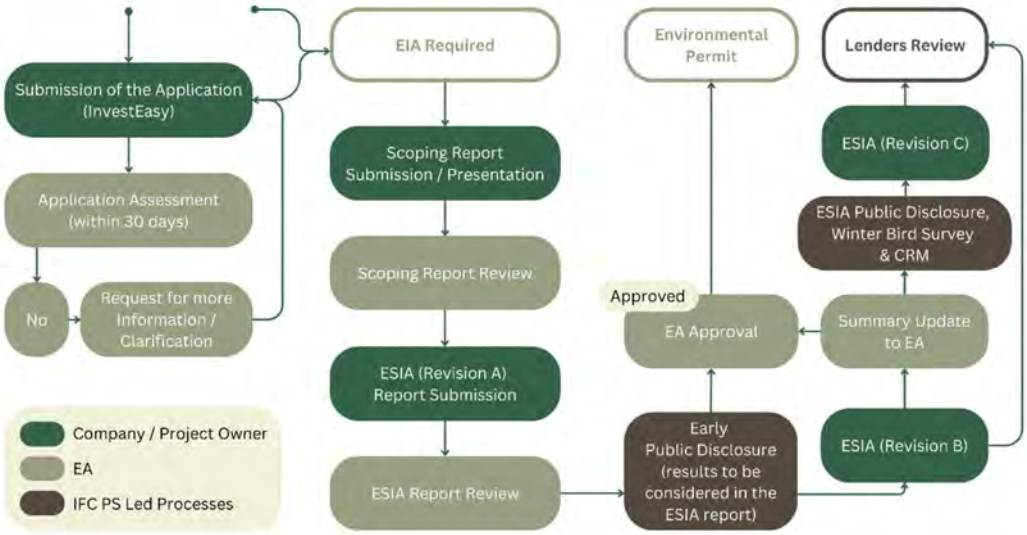
TABLE 2.4 PERMITTING PROCESS SUMMARY (EA DECISION NO. 107/2023)

Article	Summarised Description
1	Definitions pursuant to AD 107/2023. Environmental Permit: The approval issued by the EA, by which the project owner is licensed to establish the project after ensuring its environmental safety. This includes general environmental requirements and technical environmental measures and conditions.
2	Activities must be classified into categories (A, B, or C). The provisions apply to all projects unless otherwise specified by existing laws and regulations.
3	Owner to apply to EA for an environmental permit before operations.
4	Projects are classified into three categories (A, B, C) based on their environmental impact, determined by the EA President.
5	The Authority shall determine the safe areas[1] for projects of various types. The Authority may exempt projects from these distances if their environmental studies prove their ability to reduce the project's environmental impact.
6	Authorized inspectors can conduct environmental inspections at all project stages to ensure compliance.
7	The application for an environmental permit is submitted by the project owner or their legal representative to the Authority using the form prepared for this purpose, accompanied by the location of the project and Environmental impact assessment study – if required. The Authority may request any other data or documents according to the nature of each project and may conduct necessary inspections to decide on the environmental permit application.
8	The Authority must decide on the application within 30 working days. Lack of a decision implies rejection, and reasons for rejection will be provided.
9	The environmental permit is valid for a period not exceeding three years, and renewable for a similar period.
10	After obtaining the environmental permit, the project owner must fulfill all environmental requirements stated in the environmental permit before starting the project.
11	Renewal applications must be submitted at least 30 days before expiration (MD 152/2023). Category A projects will incur a fine of OMR 300 if the permit is more than 10 days past its expiry date (in addition to a renewal fee).
12	If the environmental permit application relates to construction activities, the project owner must deposit a financial guarantee of 5,000 Omani Riyals for infrastructure projects such as roads, railroads, sewerage networks, water and electricity networks, telephone networks, and high-voltage towers. The Authority can deduct from this guarantee to cover environmental correction costs, and the project owner must replenish any deducted amount during the permit's validity. The guarantee will be returned upon project completion and site rehabilitation.
13	Project owners must conduct environmental audits in specific cases, such as incidents causing pollution, inspection findings of pollution, certain study requirements, or environmental complaints. The audit must be reviewed by an approved consultant, and recommendations must be implemented within a specified period.
22	Category A fees for issuance and renewal of an environmental permit is OMR 900.

[1] The area separating the source or area of work from ecosystem or heritage area or natural resource, which requires a special protection.

A summary of the Omani EIA approval process carried out for the ESIA to national standards (ESIA A) in conjunction with IFC PS led processes to be carried out for the International ESIA (ESIA B and ESIA C) is presented in Figure 2.4.

FIGURE 2.4 EIA APPROVAL PROCESS IN OMAN, INCLUDING IFC PS LED PROCESSES REQUIRED BY INTERNATIONAL LENDERS



Note 1: Social data gathering, and public disclosure/consultation process carried out during the International ESIA stage. Oman does not require public disclosure/consultation for the Local ESIA.
Note 2: The summary update to EA is not a required step. It is a suggested step only of the results of ESIA Rev B differ sufficiently from EIA Rev A.

Source: ERM/5OES, 2024.

2.4.4 OTHER RELEVANT PERMITS

The proposed Project is also subject to the following key permits:

- A power-production permit is required from the Authority for Public Services Regulations (APSR) to construct and operate a power plant (according to RD 78/2004).
- A generation license for renewable energy is required from the Authority for Public Services Regulations (APSR) to generate electricity (according to RD 78/2004).
- A construction permit is required to be issued by the Local Municipality.
- Approval from the Ministry of Heritage and Tourism (MHT) is required, if relevant (according to RD 35/2019).
- Approval from the Civil Aviation Authority to build and operate a solar farm nearby an airport.

2.5 INTERNATIONAL BEST PRACTICE STANDARDS AND GUIDELINES

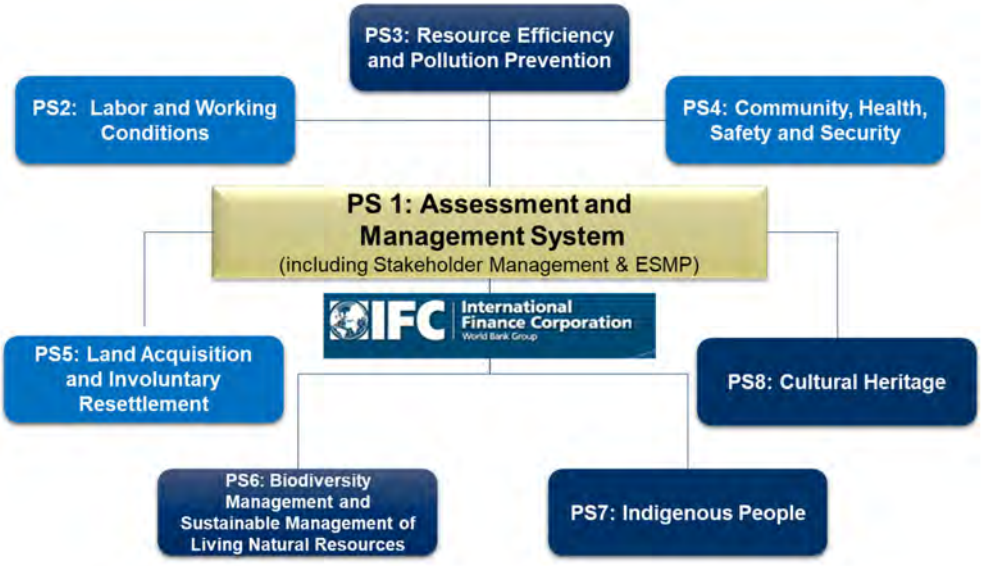
International financing may be required for the Project to proceed. As such, the Project will need to comply with the International Finance Corporation (IFC) Performance Standards (PS) and IFC Environmental, Health and Safety (EHS) Guidelines and the Equator Principles (EPs), which are adopted by the majority of the world's major project finance banks.

Compliance with these international standards will be via the impact assessment and mitigation developed in this ESIA B, and additional documents supporting the implementation of mitigation and management measures, such as the Environmental and Social Management and Monitoring Plan (ESMMP) and individual supporting management plans for specific topics which will be implemented within the framework of a robust Environmental and Social Management System (ESMS).

2.5.1 INTERNATIONAL FINANCE CORPORATION PERFORMANCE STANDARDS

The Project documentation will need to align with the 2012 International Finance Corporation (IFC) Performance Standards (PS) and IFC Environmental, Health and Safety (EHS) Guidelines. The IFC PS provide a framework through which to manage environmental and social risks and impacts of a project. There are eight PS, which cover a range of environmental and social topics (Figure 2.5).

FIGURE 2.5 IFC PS FRAMEWORK



Implementation of the IFC PS should lead to a project that: promotes sound and sustainable social and environmental performance and looks to constantly improve performance in this area; demonstrates improved financial, environmental and social outcomes; identifies and assesses its environmental and social impacts; avoids, minimizes and mitigates impacts wherever possible; and ensures that affected communities and local stakeholders are appropriately engaged.

A summary of the IFC PS that are relevant to the Project is included in Table 2.5. Performance Standards 5, 7 and 8 are not relevant to the Project as no land is being acquired/restricted from current use, no involuntary settlement is taking place, no indigenous people are affected by the Project and as no archaeological remains are expected to be encountered on the Project site. This has been confirmed as detailed in the chapters of this ESIA.

TABLE 2.5 SUMMARY OF THE PROJECT'S RELEVANT IFC PS

IFC Performance Standard		Description
1	Environmental and social risk and impact assessment	Underscores the importance of managing environmental and social performance throughout the life of a project (any business activity that is subject to assessment and management).
2	Work and working conditions	Recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by the protection of the fundamental rights of workers.
3	Efficiency of the use of resources and pollution prevention	Recognizes that increased economic activity and urbanization often generate increased levels of pollution to air, water, and land and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels.
4	Health and safety of the community	Recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts.
6	Conservation of biodiversity and sustainable management of living natural resources	Recognizes that protecting and conserving biodiversity, maintaining ecosystems services, and sustainably managing living and natural resources are fundamental to sustainable development.

2.5.2 IFC ENVIRONMENTAL, HEALTH AND SAFETY GUIDELINES

The IFC Environmental, Health and Safety (EHS) Guidelines are technical reference documents that address IFC's expectations regarding the industrial pollution management performance of projects. This information supports actions aimed at avoiding, minimizing, and controlling EHS impacts during the construction, operation, and decommissioning phase of a project or facility.

In the context of the Project, the most relevant EHS Guidelines to be considered are:

- World Bank Group General EHS Guidelines (2007).

2.5.3 THE EQUATOR PRINCIPLES

The Equator Principles (EPs) are a set of agreed principles by financial institutions (i.e. lenders) to determine, assess and manage environmental and social risk in project financing. The EPs emphasize that lenders will seek to ensure that the Project is developed in a manner that is socially responsible and reflects sound environmental management practices.

These principles have been adopted by a wide range of banks and lenders all over the world in order to manage the social and environmental risks associated with their potential investments.

The ten EPs are listed below:

- Principle 1: Review and Categorisation;
- Principle 2: Environmental and Social Assessment;
- Principle 3: Applicable Social and Environmental Standards;
- Principle 4: Environmental and Social Management System and Equator Principles Action Plan;
- Principle 5: Stakeholder Engagement;

- Principle 6: Grievance Mechanism;
- Principle 7: Independent Review;
- Principle 8: Covenants;
- Principle 9: Independent Monitoring and Reporting; and
- Principle 10: Reporting and Transparency.

It is worth noting that in October 2020, the most recent version of the Equator Principles 4 (EP4) came into effect for all mandated transactions. EP4 places emphasis on the following areas that will also need consideration during the assessment and management of Project related risks: effective stakeholder engagement and grievance mechanisms for affected communities and workers; appropriate supply change management; and assessment of relevant climate physical risks.

The latest updates in the EP4 requirements are related to the Human Rights Risk Assessment (HRRA) (latest update in 2020) and the Climate Change Risk Assessment (CCRA) (latest update in May 2023).

The 2020 Guidance Note on HRRA include:

- Carry out initial scan of potential/actual project-level adverse Human Rights impacts using United Nations Guiding Principles methodology, noting which stakeholders could potentially be affected and by which risks, if any.
- If results of initial screening point to lower risks, provide high-level statement of risks or comments in a form acceptable to the Equator Principles Financial Institutions (EPFI) for review. This is the case for this particular project.
- If results of scan point to higher risks, carry out additional research to understand risks and how they should be avoided, mitigated, and/or remediated. Include results in documentation for review by EPFI. This has not been required for this particular project.
- Ensure assessment includes information on project level grievance mechanism.

Regarding the CCRA, the 2023 Guidance Note includes additional requirements compared to the 2020 Guidance Note as presented in Table 2.6.

TABLE 2.6 MAIN CHANGES FROM THE 2020 CCRA GUIDANCE NOTE TO THE LATEST 2023 CCRA GUIDANCE NOTE

CCRA 2020 Guidance Note requirements	CCRA 2023 Guidance Note additional requirements
• Consideration of physical and transition risk	• Consideration of physical/transition climate-related opportunities
• Review of the Project's vulnerability and exposure	• High-level quantification of the financial impact of potentially material risks (and financial materiality thresholds for the Project)
• Identification of current and future anticipated risks which could be material to the Project	• If financially material risks are identified – develop a Climate Change Risk Management Plan (CCRMP)

CCRA 2020 Guidance Note requirements	CCRA 2023 Guidance Note additional requirements
• Consideration of management/mitigation measures which could impact risk materiality	• The CCRMP will aim to ensure that risks are appropriately monitored, managed and considered within the Project's design

It is noteworthy that, based on the nature and scale of this renewable energy project, annual estimate of greenhouse gas (GHG) emissions (Scope 1+2) over the lifetime of the Project is expected to be less than the EP4 threshold value of significance of 100,000 tonnes of carbon dioxide equivalent (tCO_2e) per year, which means that a GHG Alternative Analysis is not required. Likewise, since the energy generated by the Project will avoid emissions that would otherwise be generated wholly or partly from more carbon-intensive higher GHG emitting sources and since it is a renewable energy generation project, whose operation phase emissions are considered to displace emissions that will otherwise be sourced from other electricity generation technologies, no transitional CCRA is considered necessary. The Project is, in fact, considered to have a positive impact on climate change.

Regarding the physical CCRA, ESIA B presents a screening assessment to examine if there is any potential physical material risks and opportunities. After this screening assessment, if potential material risks are identified, these will be further assessed in later stages of the Project. See Appendix D for more details.

2.6 TOTALENERGIES' CORPORATE STANDARDS

The ESIA process will be carried out taking into consideration the requirements of the following TotalEnergies' corporate standards:

TABLE 2.7 TOTALENERGIES' CORPORATE STANDARDS

General Specification Document	Description
Environmental and Social Impact Assessment Study of Industrial Project Activities (GS GR HSE 410)	This General Specification defines the environmental and societal requirements for undertaking an integrated ESIA. It defines the content of the ESIA study and its organization, processes including stakeholder engagement, content of the different phases and associated deliverables. It is the standard required by the Company to assess impacts on the physical, biological, and human environments. It should be adapted to the national requirements and to the stakes and scale of each project in terms of size, sensitivity, and schedule, in order to define a specification or Scope of Work (SoW). Also, the ESIA shall include an assessment of environmental and social risks as well as an assessment of the impacts on health and human rights whenever needed.
Environmental Baseline and Monitoring Studies (GS EP HSE 411)	This General Specification defines the technical instructions for compiling a detailed Scope of Work (SoW) in order to establish the reference environmental status or to carry out environmental monitoring. This General Specification is the minimum standard required by Company and shall be adapted to each project in order to define a particular specification or SoW.
Social Baseline Study (GS EP SDV 101)	This General Specification defines the Company requirements for establishing a Social Baseline Study (SBS). It is the basic standard required by the Company

General Specification Document	Description
	and sets out the study content, phases and expected results. Local laws and rules must be respected, and further specific conditions added if necessary.
Human Rights (GS EP SDV 103)	This General Specification defines the Company guidelines for conducting a Human Rights Impact Assessment (HRIA) once a decision has been taken to undertake the assessment. It is the basic standard required by the Company and sets out the content, phases and expected results.
GIS Deliverables for HSE (GS GR HSE 412)	This General Specification provides standards, procedures, and guidelines to ensure the proper Geographical Information System (GIS) data deliverable is generated and provided by contractors or consultants in the context related to Health, Safety, Social & Environment (HSE) studies. It shall be used to ensure compliance with regards to data structure and governance for GIS deliverables.
Geomatics (GS EP POS 003)	This Geral Specification defines and assures accurate three-dimensional surveying and mapping for the Company.

3 PROJECT DESCRIPTION

3.1 OVERVIEW

This section provides a description of the Project, its components and its activities during the construction, operation, and decommissioning phases. This section is based on the information provided by the Project Proponent available at the time of writing this report. As Project design develops and further details are available, TTE/OAQE will follow the Design Change Management Procedure (see Appendix E) to ensure that E&S aspects are considered and managed appropriately.

The Project comprises an onshore Solar PV farm with a 105 MW (128 MWp[1]) installed capacity and a maximum delivered capacity of 105 MWac at day. The production will be met through the installation of either 218,805 PV modules, each with a capacity of 585 Wp, or by 206,460 PV modules, each with a capacity of 620 Wp; however, at this stage, the first option is the one being described across the document.

Generated electricity from the solar panels will be transmitted via a buried Medium Voltage (MV) collection cable system to a step-up substation, located at the west of the solar farm, where two power transformers will be placed to step-up the voltage to PDO's requirements (the Off-taker). Power evacuation from the step-up substation to the existing PDO's Saih Nihayda Depletion Compression (SNDC) substation will require a 132 kV interface yard and a Twin ELM 132 kV overhead transmission line (OHTL) of about 5 km long. Power evacuation components are not part of the Project' scope, but are considered associated facilities; their design, construction, operation, and decommissioning will be carried out by PDO as a separate transmission project, with the corresponding environmental assessment and permitting process.

In accordance with IFC definitions (Figure 3.1), ERM proposes the Project falls under **Category B**, justified by the conclusions of the Impact Assessment described in Chapter 7.

FIGURE 3.1 PROJECT CATEGORIES AS DEFINED BY IFC

[1] Megawatt Peak (MWp) refers to the maximum power output of a solar photovoltaic (PV) system under ideal conditions, such as when the sun is shining directly on the panels and the temperature is at an optimal level.

3.2 PROJECT JUSTIFICATION

Oman's national vision and political and administrative framework have set the path for the development of renewable energy projects in the country. The Oman Vision 2040 provides national targets and priorities that shape the country's regulatory and administrative framework and ensure, among other priorities, a diversified and sustainable national economy and the protection of the nation's natural resources and unique environment. In addition, aligned with the Oman Vision 2040 and the National Energy Strategy, the Government Carbon Control Target Plan aims to facilitate a gradual shift towards a low carbon economy and a significantly reduced carbon emissions energy matrix by 2030, focusing on the extensive adoption of renewable energy and implementing energy efficiency measures as the core pillars to achieve the carbon control goals. Likewise, the Oman National Strategy for an Orderly Transition to Net Zero aims to achieve carbon neutrality by 2050 and reduce the overall carbon budge, by involving a gradual approach, prioritizing cost-effective decarbonization measures and employing six main technologies (namely energy and resource efficiency, electrification and renewables, battery electric technology, sustainable hydrogen, carbon capture and storage and negative-emission solutions) to address around 90% of emissions reduction.

Aligned with the national context, the renewable energy to be generated by the Project can improve the environmental sustainability in Oman and will also supply cost effective renewable electricity to the off-taker (PDO). The Project is part of PDO's aspiration of reaching 30% of power energy capacity mix from renewable resources by 2026, and part of the sustainability goals of the shareholders of the Project Proponent (TTE and OQAE).

3.3 PROJECT LOCATION

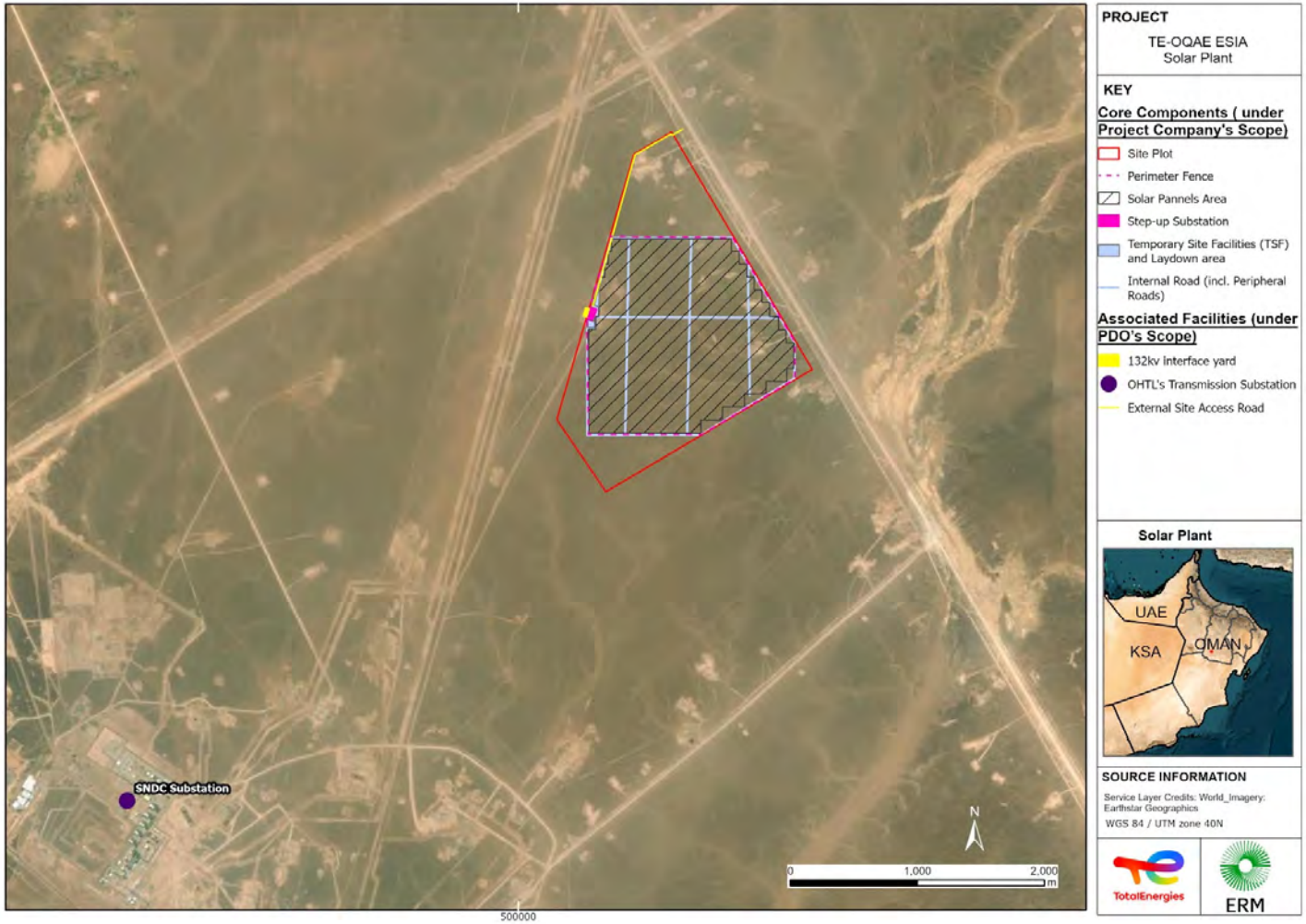
The Project site plot comprises 302 ha of leased land located on the south border of the Governorate of Al Dakhiliyah, specifically in the Wilayat of Adam, in the northern region of Oman. The elevation of the Project site ranges from 126 m to 145 m above mean sea level[1]. The site is situated in a flat desert with shrubs scattered around the area.

The Project is located within PDO's Block 6 concession area and close to PDO's Saih Nihaydah gas depletion compression facility at approximately 4 km whose purpose is to maintain reservoir pressure in the wells that make up the field. The nearest well is approximately 700 m away from the Project site. The closest airport (Qarn Alam) is located approximately 11 km south of the Project site; this airport is owned and operated by PDO. It should be noted that the Project Proponent has obtained a No Objection Certificate (NOC) from the Civil Aviation Authority (CAA) for the development and operation of this Project.

The location of the Project site and key components of the project are shown in Figure 3.2. A photograph of the typical characteristics of the site is presented in Figure 3.3.

[1] USGS Earth explorer, September 2014

FIGURE 3.2 PROJECT LAYOUT



Source: ERM, 2024

FIGURE 3.3 TYPICAL SITE CHARACTERISTICS

Source: 5OES Fieldwork. May 2024.

3.4 SITE OWNERSHIP AND LEASE

The Project site area is owned by the Oman Government and is leased to PDO via a Concession Agreement for oil and gas production and exploration purposes in Block 6. Rights to use the land for the intended purpose will be transferred to the Project Proponent via a usufruct agreement with PDO, the boundary of which will align with the footprint of the Project.

3.5 PROJECT AREA OF INFLUENCE

The spatial scope or study area for the ESIA considers the physical extent of the Project components/activities and the nature of the affected resource, the source of impact and the way the resultant impact is likely to spread beyond the physical extent of the Project activities. This is also known as the Area of Influence (AoI).

IFC Performance Standard (IFC PS) 1 defines the AoI as follows:

- *The area likely to be affected by: (i) the project and the client's activities and facilities that are directly owned, operated or managed (including by contractors) and that are a component of the project; (ii) impacts from unplanned but predictable developments caused by the project that may occur later or at a different location; or (iii) indirect project impacts on biodiversity or on ecosystem services upon which Affected Communities' livelihoods are dependent.*

- *Associated facilities are facilities that will not have been constructed or expanded if the project did not exist and without which the project will not be viable.*
- *Cumulative impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted.*[1]

The appropriate level of assessment and management of risks and impacts is determined by the degree of control that a project can exercise over its facilities or activities, and by the importance of the facilities or activities to a project's successful operation. The facilities and activities ('the components') that make up this Project are therefore classified in determining the AoI, as illustrated in Figure 3.4.

Based on Figure 3.4 and the definitions of the IFC categories, the components that make up the Project are set out in Table 3.1.

TABLE 3.1 AREA OF INFLUENCE: CLASSIFYING PROJECT COMPONENTS

IFC Category	Project Component
Core components	Construction, operation, and hand-over (to PDO) of: • Internal roads (incl. peripheral roads) and drainage system • Photovoltaic system (solar panels, mounting system, etc.) • Collector cables • Step-up substation (including different buildings) • Fencing and security gates/posts • Meteorological stations
Associated facilities	• External site access road • Interface yard (including AIS bay and OHL tower) • Connection to PDO's 132kV SNDC substation through an overhead transmission line (OHTL)
Third party activities	• Waste transport and disposal sites • Port for delivery and storage of construction materials and equipment • Road transport of construction materials and equipment

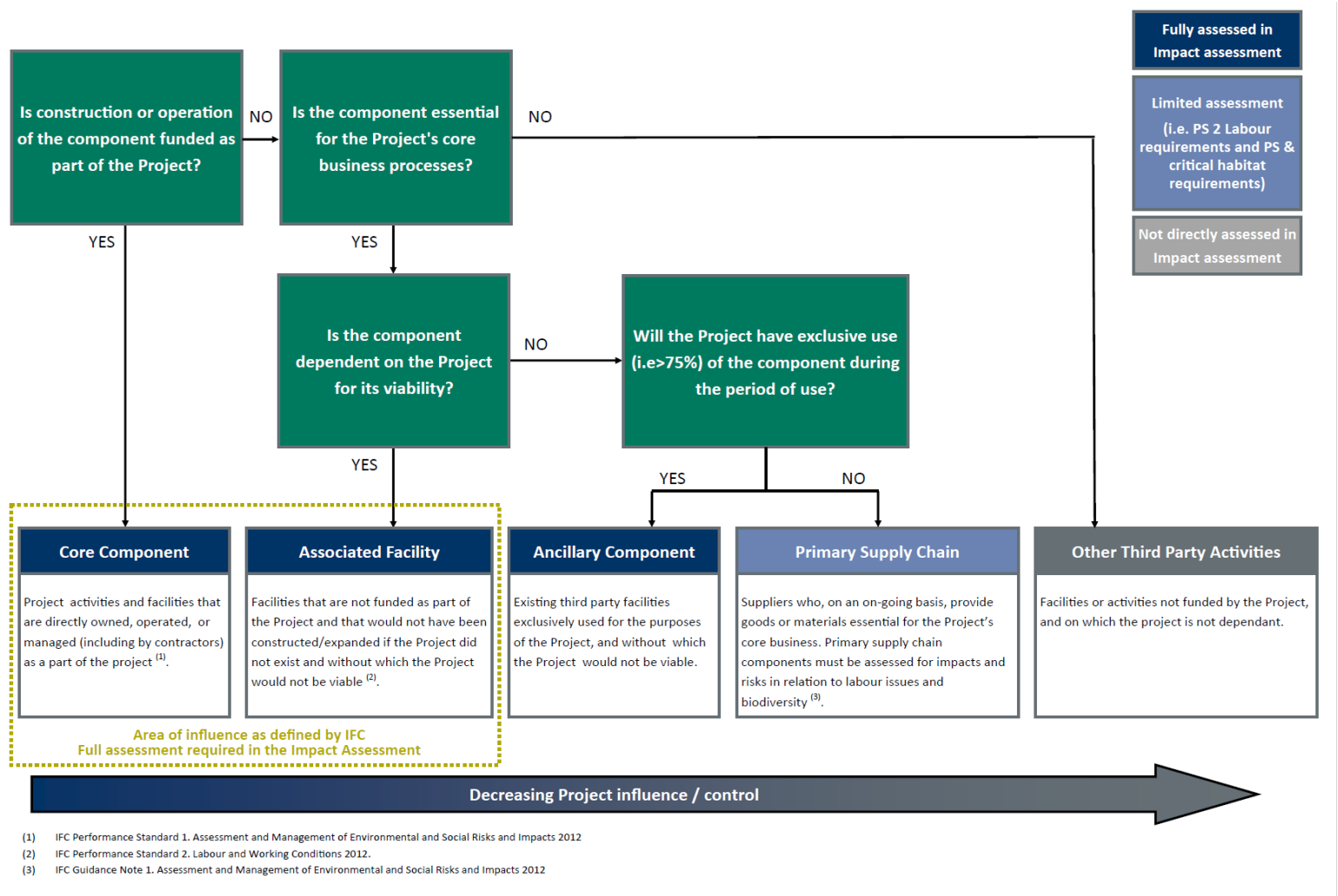
For this Project, the "direct" AoI is defined by the spatial extent of the footprint created by the core Project components, and their effects on the physical, biological, and socioeconomic environments. The "indirect" AoI comprises the existing transport corridor between the port and the Project site, as well as areas potentially affected by the landscape and visual impacts of the Project.

It should be noted that the design, construction, operation, and decommissioning, as well as the corresponding environmental assessments and permitting processes, as deemed necessary, for the associated facilities listed above, are not part of the scope of this Project, but will be responsibility of PDO as part of the Project agreements.

Details of the specific AoIs for the physical, biological, and socioeconomic assessments are described in Chapter 5 – Baseline Conditions.

[1] IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts, January 1, 2012.

FIGURE 3.4 AREA OF INFLUENCE (AOI): CLASSIFYING PROJECT COMPONENTS



Source: ERM, 2024

3.6 PROJECT SCHEDULE

It is anticipated that the construction/commissioning phase of the Project will last between 17 months in total, estimated to start in Q4 2024. The final length of the program will be dependent on seasonal working and weather conditions. If weather has the potential to complicate construction activities, these complications will be minimized through the use of 'stop rules' if appropriate.

The results of the ESIA process will also inform the programming of construction activities. If the construction needs to stop on site for an extended period, measures will be implemented to ensure the site is secure.

Where possible, construction activities will be carried out concurrently (thus minimizing the overall length of the construction program). In addition, development will be phased such that, at different parts of the site, the civil engineering works will be continuing whilst PV panels are installed. Site reinstatement will be programmed and carried out concurrently with the construction to allow reinstatement of disturbed areas as early as possible and in a progressive manner.

Finally, the Project's operation lifetime with the Project Proponent will be of 18 years after which, the Project will be handed over to PDO in year 19, as part of the Project agreements, and it is expected to continue operating for a period thereafter. The decommissioning phase will therefore become the responsibility of PDO, and it is not part of this Project's scope.

3.7 PROJECT COMPONENTS

3.7.1 PROJECT OVERVIEW

The Project comprises the construction and operation of an onshore solar farm and associated infrastructure. Key project components are summarized in Table 3.2.

TABLE 3.2 KEY PROJECT COMPONENTS

Element	Details
PV Modules, Inverters and Mounting system	• A total of 218,805 PV modules (7,545 strings x 29 In series), each with a capacity of 585 Wp. It should be noted that there is another option of using 206,460 PV modules, each with a capacity of 620 Wp; however, at this stage, the first option is the one being described across the document. • A total of 13 box-type LV-MV transformers. • Module mounting structure type will be single axis tracker. Total number of trackers will be 2,515.
External site access road (Associated facility)	• The Project site will be accessed from public paved Road 31 via a graded access road to be constructed by PDO as part of Project agreements and is outside the scope of this Project. The anticipated length of the new external access road is 1.67 km.
Internal roads (incl. peripheral roads)	• The internal road network will consist of approximately 11.2 km of newly constructed tracks. These will have a width of approximately 6 m, which includes 0.5 m shoulder on each side.

Element	Details
On-site electrical connections and step-up substation	• On-site medium-voltage (MV) cabling will be laid underground within the internal road corridor (where possible), linking the 13 LV-MV transformers to the 33kV switchgear in the step-up substation. • The step-up substation will be located in the west center of the Project plot. Two high-voltage (HV) transformers in the step-up substation will be used to step-up the voltage of the electricity for evacuation into PDO's grid to 132 kV.
Interface yard and overhead Transmission line (OHTL) (Associated facilities)	• An interface yard (including AIS bay and OHL tower), and an OHTL of approximately about 5 km long from the Project's step-up substation to PDO's SNDC substation will be constructed by PDO as part of Project agreements and is outside the scope of this Project.
Temporary construction compound	• A temporary construction compound of approximately 0.6 ha will be required during the construction phase of the Project, and it will comprise two areas of Temporary Site Facilities (TSF) and laydown areas. For some electrical panel and electronic equipment, a shed laydown area will be provided to protect the package from the sun rays and rain. For PV modules and mounting structures, several temporary laydown areas will be provided within the site to reduce the distance of in-site transportation.
Meteorological stations	• 5 meteorological stations evenly distributed within the boundary of the Project site will be installed.
Perimeter fence	• Since PV installations represent a large financial investment, a site perimeter fence will be constructed, with an approximate length of 5.6 km.

3.7.2 PROJECT LAYOUT

The layout of the Project is shown in Figure 3.2 and the coordinates of the Project plot are listed in Table 3.3. Layout will be subject to micro-siting to allow flexibility for encountering unknown ground constraints during pre-construction and construction. It should also be noted that conclusions and recommendations of the Hydrological Assessment (Worley, 2024) and other engineering studies prepared for the Project will be taken into account for such micro-siting and for the geotechnical and engineering aspects of the Project components, including flood risk mitigation.

TABLE 3.3 PROJECT PLOT COORDINATES

Solar PV Plot		
Reference	**East**	**North**
A1	501207.002	2378228.639
A2	502318.435	2376361.172
A3	500690.000	2375392.000
A4	500306.970	2375960.022
A5	500911.023	2378057.903

Note: Coordinates in UTM WGS 84 – Zone 40 Q.

3.8 DESCRIPTION OF PROJECT COMPONENTS

3.8.1 PV MODULES

In total, 218,805 modules of 585 Wp capacity will be necessary for the Project, giving a total peak power of 128 MWp. It should be noted that there is another option of using 206,460 PV modules, each with a capacity of 620 Wp; however, at this stage, the first option is the one being described across the document.

The total module area of the project will be approximately 199 ha. All PV panels will be of the same design and model and will be connected and distributed in 29 series per string (total PV strings of 7,545). The design will be composed by Monotype Bifacial modules, N-type Dual Glass technology with a maximum DC voltage of 1500 V. The efficiency of the modules will be 22.65%, with an operating temperature of 45 ± 2ºC. PV panels will have the following dimensions approximately: 2.278 m ×1.134 m ×0.030 m with 31 kg of weight. PV modules model is based on Jinkosolar JKM585M-72HL4-BDV. PV modules will be anti-reflection as agreed with the Civil Aviation Authority (CAA) for their No Objection Certificate (NOC).

The modules will be installed on 2,515 trackers with a horizontal single-axis. Tracking system will be used to ensure the panels are positioned to optimize the solar radiation throughout the day. The system can also stow the panels during high winds to protect the equipment. To mount the PV modules, 11 galvanized steel foundational piles per tracker will be either screwed or pile driven into the subsurface of the site to a depth of around 1.5-2 m. The modules will be mounted at a height of 1.5 m above the ground, and they will have a ground cover ratio of 30.4 %.

A robotic system will also be installed to enable efficient dry-cleaning of the panels during operation.

A Supervisory Control and Data Acquisition (SCADA) System will be installed to continuously monitor the performance of the solar PV and electrical components during operation of the Project. Real-time data on the meteorological conditions will also be recorded. This system will assist identify issues that require maintenance during the lifetime of the Project and allow the Project to maximize generating capacity.

3.8.2 INVERTERS AND TRANSFORMERS

Inverters will be installed to turn direct current (DC) produced by the PV modules into alternating current (AC) for compatibility with the grid. The Project will include inverters, model Sungrow SG1100UD-MV-20. The potential inverter configuration to be used is known as "Skid Solution". Each string of modules in either series or parallel will correspond to one inverter. Inverters are also central components in the communication with the SCADA system, since they monitor the operation of the strings. PV inverters also have special functions such as maximum power point tracking and anti-islanding protection[1].

Additionally, 13 LV-MV box-type transformers will be distributed throughout the project layout, in order to collect the energy generated by PV modules and boost their voltage.

[1] Anti-islanding protection is a commonly required safety feature which disables PV inverters when the grid enters an islanded condition. An example of islanding is when there is a power outage and the PV units continue to deliver power as long as irradiance is sufficient (i.e. the circuit detached by the outage becomes an "island").

3.8.3 EXTERNAL SITE ACCESS ROAD AND LOGISTICS

The currently managed route option to execute the material and equipment transportation is from Sohar Port located at approximately 332 km from the Project site, though other ports are also to be considered (i.e., Duqm, Qalhat or Sultan Qaboos). Following the existing road network, from Route 31 towards the Project site, the existing accesses are unpaved. A graded access road to the Project site will be constructed by PDO as part of Project agreements; this is considered as the external site access road and will be of about 1.67 km long.

A subsequent survey will be carried out at a later stage to assess the development of the area and ensure alignment with transportation requirements. This proactive approach will allow for any necessary adjustments or considerations in response to the evolving construction landscape. In addition, any planned modifications and improvements will be undertaken in consultation with local authorities.

FIGURE 3.5 PROPOSED TRANSPORTATION ROUTE FROM SOHAR PORT TO PROJECT SITE

Source: TTE, 2024.

3.8.4 INTERNAL ROADS AND DRAINAGE SYSTEM

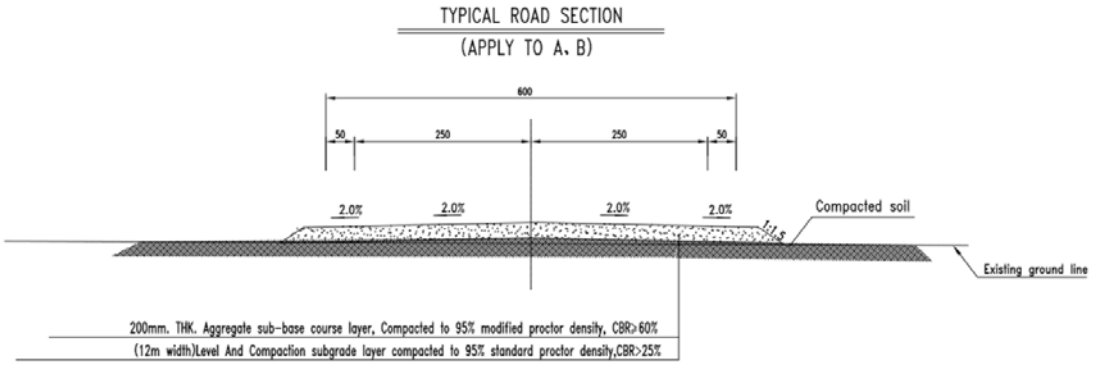
An internal road network will be established on site to connect the external site access road with the locations of the Project infrastructure to be constructed. The internal roads will be well graded, with durable granular fill material (selected as an imported fill material).

There will be two types of roads: the peripheral road and the internal roads. The peripheral road will surround all solar panels parallel to the fence and will have a length of 5.63 km approximately. Internal roads will run between the solar panels to facilitate access and

maintenance of the panels and will have a total length of 5.55 km approximately. Figure 3.6 shows an indicative section of internal road.

It should be noted that, if required by the Royal Oman Police (ROP), a 5-m external perimeter graded road will be constructed, although this is not confirmed yet at this stage. It is expected that the impacts of the construction/operation of this external perimeter road will be similar to those of the peripheral roads. Should this road be implemented by the Project, it will be managed under the Change Management Procedure of the ESMMP of this ESIA.

FIGURE 3.6 INDICATIVE SECTION OF INTERNAL ROAD



Source: TTE, 2024.

Topsoil will be stripped to expose a suitable rock or sub-soil horizon on which to build the internal roads. These will be then levelled and rolled for compaction. Generally, the surface of the internal roads will be raised slightly above the surrounding ground level.

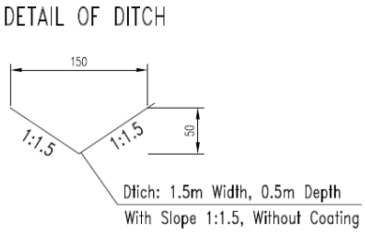
Excavated topsoils and subsoils will be stored separately adjacent to the site on appropiate ground i.e. relatively dry and flat ground. Debris will be removed and stored separately. Where possible, reinstatement will be carried out as road construction progresses.

Given that most of the terrain on the site is flat and local rainfall is relatively small, mainly scattered drainage has been assumed to occur in the internal roads. In that sense, a natural surface drainage scheme will be adopted, and no drainage gutters, trenches, or causeways will be included. A typical layout of a drainage ditch is shown in Figure 3.7.

In case that the internal roads cross wadis, all site activities will respect and keep the original topography as much as possible during the construction. To prevent the site to be split into different drainage catchments, the internal roads will be graded as per the existing ground elevations and follow the natural ground slope.

The abovementioned considerations for the drainage system will be further analyzed by the Project Proponent and the EPC following the conclusions and recommendations of the Hydrological Assessment prepared for the Project (Worley, 2024) for flood risk mitigation of Project components.

FIGURE 3.7 TYPICAL LAYOUT OF DRAINAGE DITCH



Source: TTE, 2024.

3.8.5 ELECTRICAL CONNECTIONS ON-SITE

Buried MV collector cables will link the LV-MV transformers to the 33kV switchgear in the step-up substation. These cables will run within the site plot following the same alignment as the internal road corridors (where possible), and therefore will not require any additional land take. Galvanized steel pipe is considered for MV cable protection when crossing the internal roads. The MV cable from the 33kv transformer to the step-up substation will be an aluminum conductor and will be buried directly in the ground.

Detailed construction and trenching specifications will depend on the ground conditions encountered at the time, but typically, cables will be laid in a trench approximately 1.5 m deep and 1.5 m wide. The dimensions of the excavated trenches will be determined based on the results of geotechnical surveys to be completed prior to construction. To minimize ground disturbance, cables will be installed within the corridor of the internal roads.

Any excavations for trenches will be cordoned off and marked clearly. Cable hauling operations will be coordinated with traffic movements. Cable off-cuts and waste from terminations will be systematically collected, stored, and recycled or disposed of properly.

The power from the LV-MV transformers will be evacuated forming a loop using ring main units (RMU). Afterwards, PV panels will be divided in seven groups and then converge to the medium voltage (MV) 33 kV switchgear of the step-up substation. Once in the step-up substation, the 33kV voltage will be step-up to 132kV by two high-voltage (HV) power transformers.

3.8.6 STEP-UP SUBSTATION AND GRID CONNECTION

Considering the deployment of the MV power collection lines on the PV plant, one 132 kV step-up substation will be constructed. It will be deployed at the west of the PV plant after considering convenience of being connected to the site access road, convenient traffic conditions, closeness to towns, and more sunlight.

The area for the step-up substation will be prepared by removing the topsoil and subsoil down to competent bearing strata, and concrete foundations will be required to take the weight of the components. An electrical earth network will be buried around the building

Two high-voltage (HV) power transformers in the step-up substation will be used to step-up the voltage of the electricity for evacuation into PDO’s grid (SNDC substation) from 33 to 132 kV. Two sets of auxiliary 33/0.4 kV transformers and 25-MVar capacity banks will also be part of the step-up substation to provide the reactive power compensation (this last aspect will be subject to the detailed engineering phase).

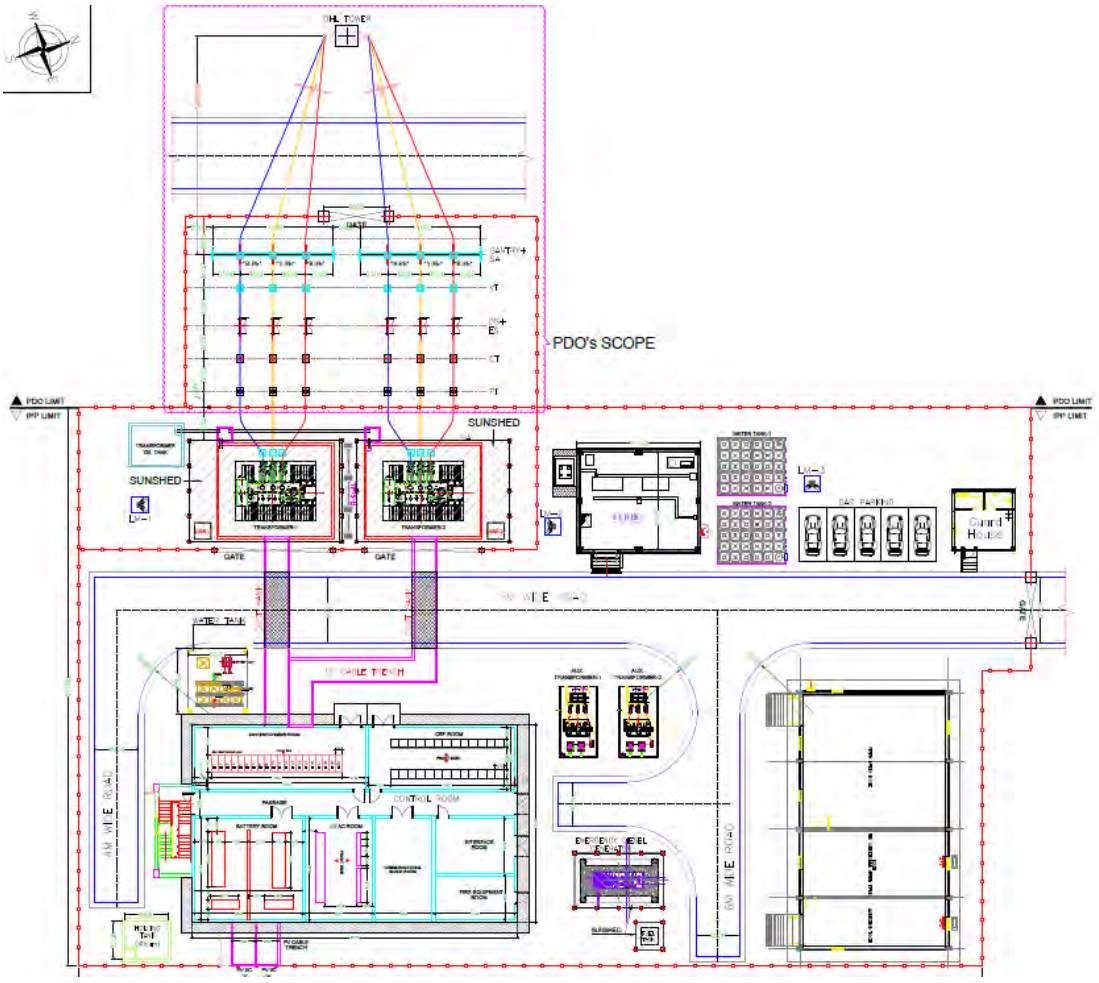
A security guard room will be deployed beside the main entrance. Chain link fence will be provided around the substation with an entrance gate.

The step-up substation will be designed with around three main buildings, and each of the buildings of single floor (Figure 3.8):

- Control building will be equipped with a 33kV switchgear room, relay & control room, battery room, telecommunication room, LVAC Room, Interface room, and Fire equipment room.
- O&M Building (on the top of Control building) includes 02 office rooms, engineering office hall, meeting room, male/female toilets, shower/changing room, prayer room, canteen room & kitchen, and cleaning room.
- Warehouse (for substation and WTG) is the storage space for WTG spare components, and various BOP spare parts.

Other fields on the substation plot will be deployed for electrical balance of the substation equipment including capacitor bank, power transformers and lightning arrestors.

FIGURE 3.8 CONCEPTUAL LAYOUT DRAWING OF THE STEP-UP SUBSTATION



Source: TTE, 2024.

Lighting will be kept to a minimum and will be limited to working areas only. Any installed lighting will comply with health and safety requirements.

Power evacuation from the step-up substation to PDO's grid will require a 132 kV air-insulated switchgear (AIS) bay, a 132 kV overhead line (OHL) tower, and a Twin ELM 132 kV overhead transmission line of about 5 km long. Power evacuation components are not part of the Project' scope, but are considered associated facilities; their design, construction, operation, and decommissioning will be carried out by PDO as a separate transmission project, with the corresponding environmental assessment and permitting process.

Communication interface system between the step-up substation and Transmission System Operator (TSO)'s SCADA system at the TSO's Load Dispatch Centre (LDC) is under PDO's scope, and the Project Proponent will be responsible for all Fiber Optic Cord (FOC) patch cords. The patch panels in the telecommunications panel will be the interface for the following signal exchange: inter-tripping signals, protection signals, interlocking signals, monitoring signals, measurements signals, metering signals, ad voice communication.

3.8.7 TEMPORARY SITE FACILITIES (TSF) AND LAYDOWN AREA

Two areas for TSF and Laydown will be constructed west of the Project area. They will have total area of 0.6 ha. Laydown area will be used for temporary storage of construction materials and wastes. TSF includes a temporary office and canteen units which will include 4-8 onsite portacabins for the construction. TSF also includes temporary collection of all greywater and sewage generated from the temporary workforce on site, water storage tank (for cleaning) which will likely be fed on site by tanker bowser and diesel storage tank for vehicles and equipment within bunded areas, in order to avoid any potential for unintended release into the environment.

For some electrical panel and electronic equipment, a shed laydown area will be provided to protect the package from the sun rays and rain. For PV modules and mounting structures, several temporary laydown areas will be provided within the site to reduce the distance of in-site transportation.

3.8.8 FENCING AND SECURITY GATES/POSTS

PV installations represent a large financial investment. The PV modules are not only valuable, but also portable, and the copper collector cables can be the target of theft. Security solutions are therefore required to reduce the risk of theft and tampering.

One guardhouse will be constructed at the entrance of the PV plant. The Project site will be fenced during the preliminary works and 24/7 security will be installed on site as soon as the first batch of construction material is delivered. Fence will be a normal chain link fence installed around the entire project area. Approximate length of the fence is 5.6 km.

3.8.9 ACCOMMODATION CAMPS

At this stage, it is not yet defined where accommodation camps for construction or operation will be located; however, the following potential option is being managed:

- Utilization of existing PDO's contractor's camps nearby at Qarn Alam camp such as Arab Sea Line, Arab Sea Line (Saih Rawl Camp), RS PAC Qarn Alam (Tawos Motel).

All Project accommodation camps will not be sited in sensitive environmental locations and will be required to adhere to IFC Workers Accommodation Standards.

3.8.10 METEOROLOGICAL STATIONS

The Project will include the installation and operation of five meteorological stations evenly distributed within the boundary of the Project site in such a way to minimize shading and so that the average of their data will lead to a reasonable and representative average weather profile of Plant. All sensors for measuring direct, diffuse and global irradiation will be cleaned every day before operation in order to guarantee correct data collection.

3.8.11 MEDICAL AND SAFETY FACILITIES

Basic first-aid facilities will be available on-site during construction and operation of the Project and staff will have completed appropriate training. If injured staff require more-serious medical attention, they will be transported to the nearest medical center.

Fire-fighting equipment will also be available at the Project site and staff will be suitably trained to manage any incidents.

3.9 CONSTRUCTION PHASE

In summary, the construction/pre-commissioning/commissioning phase will comprise of the following activities[1]:

- Site preparation: including clearing, grading, and levelling to create flat land;
- Construction of temporary construction compound, lay-down area and guardhouse;
- Construction of internal roads and drainage system (as required), inter-linking the external site access road, panels' locations and step-up substation;
- Installation of security fencing and security system around the Project site;
- Vehicle movement, including road transportation of project components from Sohar Port to the site;
- Influx of workers;
- Installation of inverters, transformers, PV panels and their foundations, step-up substation, meteorological stations, electrical infrastructure and signal cables;
- Excavation of trenches for cable laying;
- Resource consumption (water, energy, etc.);
- Waste and wastewater management;
- Removal of construction equipment and temporary facilities and reinstatement; and
- Commissioning of site equipment.

The Project will be constructed in accordance with documented ISO 14001 (2015) environmental management procedures which ensure compliance with applicable environmental legislation and best practice.

Effective communication underpins the whole system of environmental management, ensuring appropriate information passes between the Project Proponent and the Engineering, Procurement and Construction (EPC) contractors engaged. This ensures that environmental considerations are fully integrated into the management of the Project throughout

[1] The EPC Contractor, through a local company, will be responsible for carrying out and completion of the EPC works including the design, engineering, procurement, manufacture, construction, testing, commissioning and defect rectification of the EPC works. The SPV will also be responsible for the operation and maintenance of the PV plants during 25 years following the commercial operation date.

construction, operation, and maintenance of the completed Project and ultimately to decommissioning.

3.10 OPERATION PHASE

During the operation and maintenance phase, the following activities will be undertaken:

- Workers management;
- Vehicle movement;
- Routine inspections and site maintenance and security;
- Routine road maintenance;
- Resource consumption (water, energy, etc.);
- Dry cleaning the PV modules using a robotic system (cleaning robot operator working 8 h/day in night shift mainly);
- Waste and wastewater management;
- Remote monitoring of the power generation performance.

Regular maintenance will be required to ensure that the solar farm is kept in optimal working order. Most day-to-day facility operations will be conducted remotely using computer networks and a small team. Some limited unscheduled maintenance and repair activities may need to be undertaken occasionally on-site.

3.11 REPOWERING OR DECOMMISSIONING

Repowering or decommissioning is not part of the Project Proponent's scope. The solar farm is planned to be handed over to the Off-taker (PDO) in year 19 of the operational lifetime of the Project as part of the Project agreements. Therefore, PDO will be responsible for this phase.

After conducting a comprehensive assessment of the infrastructure, PDO will evaluate the feasibility of repowering for enhanced efficiency and energy generation. A careful evaluation of the existing infrastructure will determine the extent of necessary upgrades. PDO will choose new components based on advancements in solar energy technology. All decisions will be made with a focus on environmental responsibility, economic feasibility, and the long-term sustainability of energy generation in Oman. PDO will require the necessary permits for repowering, adhering to local and national regulations. This will involve consultations with relevant authorities to ensure compliance with the standards of that time.

If it is decided to decommission the Project, a decommissioning plan, including site clean-up, will be prepared and submitted to the relevant authorities prior to commencing any decommissioning works. All decommissioning will be handled following the regulations of waste handling. Decommissioning will generate traffic associated with worker movements, disassembly of panels, and transport of materials away from the site, along with temporary or permanent road infrastructure improvements necessary to facilitate those activities. Overall, it is assumed that decommissioning will result in impacts similar in character and significance to those identified for the construction phase but over a shorter period (i.e. 6 months). Because detailed decommissioning plans will not be available for many years, this phase is not evaluated in detail.

3.12 USE OF RESOURCES AND ENVIRONMENTAL INTERFERENCES

The use of resources and environmental interferences are summarized in the following Sections. Please note that for decommissioning phase, no available information is available at the moment of writing this report. Therefore, the use of resources and environmental interferences shall be detailed in Decommissioning Management Plan (See Chapter 8 for further information).

3.12.1 LAND USE

3.12.1.1 CONSTRUCTION PHASE

During the construction period, it is estimated that approximately 206.84 ha of land will be required, which includes all temporary and permanent infrastructure. This area includes additional areas beyond the components and infrastructure that will be disturbed by associated earthworks. These areas will only be used during construction and will be reinstated during the post-construction/ operation phase. During site preparation and construction of the Project, 68.5% of the total site plot area of 302 ha will be required.

A summary of Project construction land take is presented in Table 3.4. The land take areas are indicative, based on the current design.

TABLE 3.4 SUMMARY OF EXPECTED PROJECT CONSTRUCTION LAND TAKE

Main core component	Approximate Land Requirement (hectares / ha)	Land take duration
PV modules area	199 ha	17 months
Step-up substation	0.52 ha	
Temporary construction compound (TSF + Laydown area)	0.6 ha	
Internal roads (incl. internal roads, peripheral roads and MV collector cables)	6.72 ha	
Total	**206.84 ha**	

3.12.1.2 OPERATION PHASE

Operational land take is estimated to be about 68.3% of the total Project site plot and is described in Table 3.5. It is estimated that the permanent footprint of the Project following completion of construction will be approximately 206.24 ha. The land the Project requires from the construction phase to the operational phase (for the lifetime of the Project) will therefore reduce from a total of 206.84 ha to 206.24 ha, respectively.

TABLE 3.5 SUMMARY OF EXPECTED PROJECT OPERATIONAL LAND TAKE

Main core component	Approximate Land Requirement (hectares / ha)
PV modules area	199 ha
Step-up substation	0.52 ha
Internal roads (incl. internal roads, peripheral roads and MV collector cables)	6.72 ha
Total	**206.24 ha**

3.12.2 WATER SUPPLY AND CONSUMPTION

3.12.2.1 CONSTRUCTION PHASE

Water requirements on-site will primarily consist of water for domestic purposes and drinking water for the construction teams. Therefore, during the busiest period of the construction phase with a workforce of 500 people approximately, a volume of 100,000 liters/day is expected (200 liters/worker/day). This volume will fluctuate depending on the number of workers on-site over the construction period.

Water will be transported to site from known and secured sources via water tankers. Groundwater abstraction to supply water is not considered as part of the Project activities at this stage. The EPC contractor will provide more detailed information in the construction environmental management plan (CEMP) and associated Method Statements.

3.12.2.2 OPERATION PHASE

Solar PV panels generate electricity from absorbed sunlight; therefore, regular cleaning of the panels is required to maximize energy yield, especially in environments with high levels of airborne dust. A dry robotic cleaning system will be used to avoid the use of water in the cleaning process. As a back-up, should dust deposition prove to be greater than expected, the operations team may use "wet cleaning" which will be a manual operation using pressure spray system. Dry cleaning of panels is expected to save fresh water consumption in the order of 1,000 – 1,500 m^3/year if conventional wet cleaning techniques were used.

During operation, a water supply of approximately 2,000 liters/day will be required for personnel usage. The consumption rate has been established based on 10 people on site consuming on average 200 l/day per person.

3.12.3 RAW MATERIALS

Raw materials required for construction of the Project will predominantly be aggregate for installation of the internal/peripheral roads, solar panels, and step-up substation foundations.

Solar PV plant will require about 27,665 galvanized steel foundational piles and 218,805 PV modules. Steel piles and PV modules are 100 % and 96 % recyclable respectively (Green Match, 2019).

During construction, concrete will be produced at an offsite batching plant.

3.12.4 OILS AND CHEMICAL REQUIREMENTS

3.12.4.1 CONSTRUCTION PHASE

During construction, heavy equipment and motor engine driven equipment will be fueled with diesel oil. In addition, portable diesel power generators will be used.

The use of chemicals is not foreseen except for small quantities of lubricant for the heavy equipment or cleaning before equipment assembly.

3.12.4.2 OPERATION PHASE

During operation, only light transport vehicles for maintenance operations will consume fuel. Also, diesel emergency generator will consume diesel fuel during isolated occurrences.

Lubricants and other oils and chemicals will also be required for the proper operation of the step-up substation.

3.12.5 ENERGY

3.12.5.1 CONSTRUCTION PHASE

Portable diesel power generators will be used to supply energy during the construction works. Generators will have built in or separate fuel tanks, the latter installed with impermeable secondary containment with a capacity of 110% of the fuel tank.

3.12.5.2 OPERATION PHASE

The power will come from own energy generated by the Project.

3.12.6 TRANSPORTATION AND TRAFFIC

3.12.6.1 CONSTRUCTION PHASE

The Project will generate periods of intense traffic movements during the construction phase. These periods will include heavy-load vehicles delivering:

- construction plant, machinery, equipment and materials; and
- Solar PV Plant.

As previously mentioned, it is expected that, during the Project construction phase, materials and equipment will be transported from the Sohar Port (or other optional port) to the site. Standard articulated trucks will be used to transport the equipment (i.e. there will be no abnormal loads).

3.12.6.2 OPERATION PHASE

Traffic during operation will be limited to maintenance vehicles and movement of employees around site.

3.12.7 ATMOSPHERIC EMISSIONS

3.12.7.1 CONSTRUCTION PHASE

Emissions during construction will arise predominantly from the use of generators and vehicles. The Project will cause localized, temporary impacts on air quality due to on-site

construction activities. The likely emissions from construction activities will include the following:

- fugitive emissions from site clearing, digging, filling, material handling, transportation, use of construction machinery, etc.;
- fugitive dust emissions from vehicular access along unpaved roads; and
- vehicular emissions from increased traffic volume from vehicles used during construction.

Fugitive dust emissions arising from various activities such as excavation, transportation of material (loading and unloading), and vehicular movement (on unpaved roads) will be minimized through construction site good practice.

3.12.7.2 OPERATION PHASE

Air emissions generated during operation will mainly be related to gas exhausted from the diesel-fueled emergency generator, which will be present at site; however, it will only be used for emergency and periodic testing. The operation of the diesel emergency generator will generate NOx, CO, SOx and particulate matter.

3.12.8 GHG EMISSIONS

GHG emissions during construction will be limited to carbon dioxide from vehicle exhaust emissions and the potential use of diesel generators on site. GHG emissions during operation will be limited to the exhaust emissions of personnel, maintenance and supply vehicles.

The annual estimate of GHG emissions, over the lifetime of the Project is expected to be less than the IFC and EP4 threshold values 25,000 tonnes (triggering GHG quantification) and 100,000 tonnes of carbon dioxide equivalent (tCO_2e) per year (triggering GHG Alternative Analysis and Transitional CCRA), respectively.

The energy generated in the actual Project development will avoid emissions that will otherwise be generated wholly or partly from more carbon-intensive higher GHG emitting sources. Since the Project is a renewable energy generation project, its operation phase emissions are considered to displace emissions that will otherwise be sourced from other electricity generation technologies. This is considered to have a positive impact on climate change.

3.12.9 NOISE EMISSIONS

3.12.9.1 CONSTRUCTION PHASE

During construction phase, noise emissions will be generated by heavy equipment. The main equipment in use during these activities generating noise are included in Table 3.6. Not all the equipment will be active at the same time, some of them will operate only for short period during the construction activities.

TABLE 3.6 TYPICAL NOISE POWER LEVEL FOR CONSTRUCTION EQUIPMENT

Equipment	Typical Sound Power Level [dBA]
Excavator	100 – 106
Roller compactor	105 – 106

Equipment	Typical Sound Power Level [dBA]
Grader	101 – 108
Welding/bending machine	94
Crane	98
Generator	98
Compressor	110
Truck	107
Pick-up	85
Bus	90

3.12.9.2OPERATION PHASE

During operations, noise emissions will be generated by the equipment installed, in particular, in the step-up substation which will run 24 hours a day, 7 days a week.

Special care will be taken with the acoustic insulation, where applicable, in order to maintain a sound pressure level (SPL) not exceeding 85 dB(A) measured in any position 1 meter from the equipment located in potentially manned areas and not exceeding 90 dB(A) in unmanned areas.

As so, the sound pressure level resulting from the operation of the facility will not exceed the national (MD 79/94) regulation limits at any boundary line of the site, which is 70 dB(A) at fence for industrial sites during daytime, evening, and night.

TABLE 3.7 TYPICAL NOISE POWER LEVEL FOR KEY OPERATION EQUIPMENTS

Equipment	Typical Sound Power Level [dBA]
Inverter	25-55 dB
Transformer 33/132 kV	60-80 dBA
PCS	85 dBA at 1 m from the equipment

3.12.10 WASTE HANDLING AND DISPOSAL

3.12.10.1 CONSTRUCTION PHASE

The management of hazardous and non-hazardous waste generated during construction will be detailed in the Construction Waste Management Plan (CWMP). The EPC Contractor will produce the CWMP and provide details of the quantities and types of wastes that will be generated and will provide detail on how they will be handled and disposed of.

During construction activities, the main types of wastes expected to be produced are listed below:

- Inert construction waste: this includes excavated material, building rubble and unused construction material generated during the preparation and restoration of the worksites (e.g. defective or broken material PV modules). These wastes pose no risk of pollution but need to be disposed of at a controlled disposal site.

- Domestic waste: the office, canteen and administration buildings associated with the worksites will generate amounts of domestic-type waste (i.e., food waste, paper, and packaging etc.). This type of waste will be transported to controlled local waste disposal sites.
- Oily and hazardous waste: there will be waste generated during construction that needs special handling and treatment. This will include the oily waste associated with vehicle and heavy equipment maintenance (waste oil, material collected from wastewater interceptors etc.); unused or chemical waste, paints, and solvents; any other waste, sludge or debris that is unsuitable for disposal in local-type landfills. Such wastes will be segregated for collection and disposal by specialist contractors at equipped and approved sites.

The basic approach to waste management is the incorporation of a hierarchy of five best environmental operating practices, including source reduction, reuse, recycling, treatment and ultimately disposal. Source reduction is the primary focus. Waste generation will primarily be reduced at source through suitable operating practices rather than being managed later. Where waste generation is unavoidable, an attempt will be made to minimize it through the reuse, recycling, or recovery of wastes to a practicable extent. Treatment will only be considered after reuse, recovery and recycling options have been completely exhausted. The last option is disposal, and this will be confined to designated and approved areas.

Working areas will be kept clean and tidy and any waste that is generated from these areas will be properly collected.

All wastes from work areas and from the temporary site facilities, if any, will be placed in the nearest appropriate covered waste containers. These containers will be kept in good condition and clearly identified and labelled, according to the variety and quantity of the wastes envisaged to be collected.

All hazardous wastes generated during the construction activities will be stored in a secure and clearly identified compound for subsequent disposal. Hazardous waste will be securely packaged and labelled, in accordance with legislative requirements, to ensure that the waste can be transported safely by an accredited waste disposal contractor for subsequent disposal in an approved disposal site, without risk to either those handling the waste or the environment. All necessary precautions will be taken during the handling and transport of the waste to the storage area to avoid spillage of any hazardous waste.

Wood, metal and other material with a commercial or recycling value will be properly separated and stored in segregated areas prior to removal. Good practices will be implemented in order to avoid the mixing or contamination of valuable waste, but also to keep this waste in a valuable form, easy to transport and recycled.

Domestic/office waste includes paper, aluminum cans, glass, cartons, kitchen waste etc. Domestic waste may also include certain recyclable material, such as paper, plastics, glass, and printer toner cartridges. Domestic non-hazardous waste produced at the camp as well as the small quantities of hazardous wastes (e.g., fluorescent lamps, detergents, clinical waste, spent lubricants and filters) will be taken off site and disposed at licensed landfill facility based on the waste acceptance criteria.

Oily/greasy water will not be directed into the sewage plant until the oil and grease have been removed.

3.12.10.2 OPERATION PHASE

During operation, small quantities of waste will be produced at site, mainly due to equipment maintenance. Domestic waste will also be generated.

The types of wastes that will be produced due to the project activities are expected to be the following:

Hazardous waste:

- Solid: the majority of operations producing this category of waste will be managed by Logistics entity since it will be evacuated by trucks to a landfill facility based on the waste acceptance criteria or exported abroad if necessary. It includes oil filters, hydrocarbons, batteries, printer cartridges, medical, chemicals, etc.

Non-Hazardous waste:

- Solid (recyclable or not): idem as solid hazardous waste above. It includes plastic, carton, metal, wood, tires, furniture, glass, food, etc.

Waste storage/segregation area will be composed of:

- A Waste shelter: will be a ventilated area. The area will be fenced at human height to prevent from distribution of waste due to wind. For hazardous waste storage, hazardous waste stream is estimated to be composed of oil filter, batteries, printer cartridge, contaminated soil, hydrocarbons, electric/electronic equipment waste (WEEE), empty hazardous chemical containers, oily/paint/thinner.
- A Waste open storage area for non-hazardous waste storage, general and recyclable waste streams: plastic, cardboard, metal, wood, tires, furniture, glass.

All wastes will be placed in the nearest appropriate covered waste containers. These containers will be kept in good condition and clearly identified and labelled, according to the variety and quantity of the wastes envisaged to be collected.

All hazardous wastes will be stored in a secure and clearly identified compound for subsequent disposal. Hazardous waste will be securely packaged and labelled, in accordance with legislative requirements, to ensure that the waste can be transported safely by an accredited waste disposal contractor for subsequent disposal in an approved disposal site, without risk to either those handling the waste or the environment. All necessary precautions will be taken during the handling and transport of the waste to the storage area to avoid spillage of any hazardous waste.

3.12.11 EFFLUENTS MANAGEMENT

3.12.11.1 CONSTRUCTION PHASE

The wastewater production during the construction phase will include sewage and brown water. Wastewater will be collected into a septic tank for later disposal by an authorized company. Septic tanks will be double skinned or contained within a secondary bund with a capacity of 110% of the tank that would also serve to contain an emergency overflow.

3.12.11.2 OPERATION PHASE

All streams contaminated by hydrocarbons or chemical (e.g. water draw-off from oil storage tank bottoms) will be collected and disposed as waste.

Streams potentially (or accidentally) contaminated (wastewaters from paved areas in process units, wastewaters collected from non-process facilities, in areas potentially polluted with lube oils and greases from machines, waste water from bunded areas including roof of oil/condensate storage tanks, chemicals with a limited impact on environment and no adverse effect on oil/water separation, eventual firefighting run-off and storm water first flush from potentially contaminated areas); all to be sent to the external wastewater treatment plant.

Non-contaminated water, such as rainwater on unpaved areas; paved area non-contaminated, building and shelters roofs, second flush storm water, water condensed from ambient air, rainwater from roadways and parking lots; will be drained directly on land. Storm water will be a rare occurrence due to scarcity of rainfall. If there are any accidental spillages of hazardous substances on the soil, such areas will be immediately remediated to avoid the run-offs being contaminated.

Wastewater treatment will be ensured by an external party operating. Effluents discharges will comply with local legislation and requirements.

In addition, during operation, wastewater will be produced from the process and the sanitary installations located within the site and treated as described in the construction phase.

3.12.12 EMPLOYMENT AND LABOR

3.12.12.1 CONSTRUCTION PHASE

For the construction period, during the peak of activity, it is expected there will be about 500 workers on the Project site. The Project will source locally based construction workers where feasible (e.g. low-skilled labourers). The Project will adhere to applicable Omani labour regulations and Omanisation quotas as applicable.

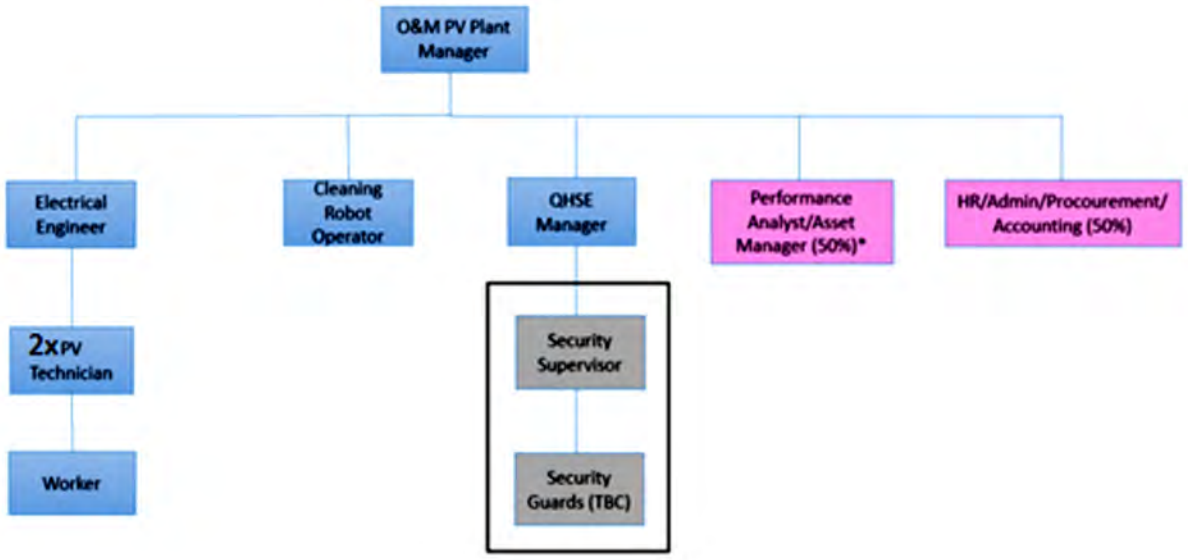
Working schedule will be 10 hours per day with overtime of 2 hours for some sections. Work will be implemented on a rotation or shift system basis.

Internationally recognized and local worker conditions, health, safety, and environment standards for workers will be applied. These will include full-time doctors and paramedics employed to provide 24-hour medical cover by direct presence or on call.

3.12.12.2 OPERATION PHASE

During operation, the Project will require up to 10 full-time staff to keep the facility maintained and working. Figure 3.9 shows preliminary the organization structure during operation. If the PV panels or electrical components sustain any damage or require technical maintenance, specialist technicians will be deployed to site as required.

FIGURE 3.9 PLANNED PV PLANT ORGANIZATION STRUCTURE



Source: TTE, 2024

3.12.13 HEALTH, SAFETY & SECURITY

Internationally recognized standards for worker Health Safety and Environment will be applied. In addition, TotalEnergies' corporate standards will be applied. The different facilities of the Project components (in particular, the Solar PV Plant, the step-up substation, etc.) are designed with respect to safety and risks as part of an integral approach.

4 ASSESSMENT OF ALTERNATIVES

4.1 OVERVIEW

The development of the Project was an iterative process, during which alternative scenarios were considered and appraised to minimize potential risks and impacts, and to optimize benefits, to both the receiving environment and the proposed solar farm.

The site selection process was part of PDO's scope, considering the potential solar resource and their demand/load centers. Post-assessing the feasibility study, PDO identified the Project site for further development with defined capacity (in Mega Watts) and released the Bid documents accordingly. Minimum Functional Specifications (MFS) and certain design limits were also set by PDO as part of their bidding process for this renewable energy project. The Project Proponent participated in the bidding process and proposed the Project layout and design indicated in this chapter and Chapter 3 within the defined site boundaries and respecting the requirements in the PDO's Request for Proposal (RfP).

4.2 NO DEVELOPMENT OPTION

As previously mentioned in Chapter 1 - Introduction, the Omani Government have put in place several policies aiming to reduce GHG emissions, to meet climate targets.

Oman's national vision and political and administrative framework have set the path for the development of renewable energy projects in the country. The Oman Vision 2040 provides national targets and priorities that shape the country's regulatory and administrative framework and ensure, among other priorities, a diversified and sustainable national economy and the protection of the nation's natural resources and unique environment. In addition, aligned with the Oman Vision 2040 and the National Energy Strategy, the Government Carbon Control Target Plan aims to facilitate a gradual shift towards a low carbon economy and a significantly reduced carbon emissions energy matrix by 2030, focusing on the extensive adoption of renewable energy and implementing energy efficiency measures as the core pillars to achieve the carbon control goals. Likewise, the Oman National Strategy for an Orderly Transition to Net Zero aims to achieve carbon neutrality by 2050 and reduce the overall carbon budge, by involving a gradual approach, prioritizing cost-effective decarbonization measures and employing six main technologies (namely energy and resource efficiency, electrification and renewables, battery electric technology, sustainable hydrogen, carbon capture and storage and negative-emission solutions) to address around 90% of emissions reduction.

In addition to the challenge of reducing GHG emissions whilst meeting increased energy demands, key goals of Oman's current energy policy also include diversifying the energy system and making it more secure and less affected by external markets. Harnessing solar power is an economical, low-carbon and competitive option in Oman that will increase energy security and opportunities for growth, as well as establish a more diverse energy system. Generation of energy from solar energy must be part of the energy mix to assist achieve the country's multi-faceted goals and objectives.

From a social perspective, a 'No Project' option would also remove the potential of employment opportunities for the local population.

With regards to environmental aspects, although construction of the Project may result in potential temporary adverse impacts, Project operation will result in an overall positive impact,

particularly due to the development of utilities and socio-economic benefits and the increase in renewable energy being supplied to PDO.

The option of not proceeding with the development was therefore discarded when considered against the benefits of establishing a new renewable energy source, as outlined above.

4.3 SITE SELECTION

As stated before, the Off-taker defined the final location and area of the Project site plot. The following aspects were considered throughout the site selection process:

- solar energy resource: locating the Project site in a suitable solar energy area;
- power grid: locating the Project site as close as possible to a connection point into PDO's grid to avoid increasing the length of the associated transmission line;
- physical: locating the Project site to meet required technical specifications but minimize potential impacts on topography, geology, hydrology and landcover;
- natural: locating the Project site sensitively to avoid or minimize potential impacts on main natural features such as surface water features, wetlands and protected areas; and
- social: locating the Project site sensitively to avoid or minimize potential impacts on residential areas/buildings, and existing and future oil and gas infrastructures in PDO's Block 6. The Project site is located away from settlements and in an area with an industrial character. The Project site is located within the aeronautical easement of the Qarn Alam Airport owned and operated by PDO (the Off-taker). Given that PDO has selected the site, the necessary operational arrangements for the Solar PV plant to coexist with the airport will be agreed with PDO. Up to date, the Project Proponent has obtained a No Objection Certificate (NOC) from the Civil Aviation Authority (CAA) for the development and operation of this Project, in which there is a commitment to use anti-reflection PV panels; no further technical studies (e.g. glint and glare analysis, etc.) need to be conducted as agreed with CAA.

4.4 PROJECT LAYOUT & DESIGN

The Project layout and design was defined by the Project Proponent and was revised iteratively as technical assessments including the ESIA process, were undertaken throughout the development process, to maximize electricity generation but minimize impacts to the receiving environment and risks to the Project.

As stated before, the Project layout and design were limited by PDO's requirements as part of their RfP in their bidding process for this renewable energy project:

- Main limitation on the installed capacity for this Project comes from the limitation on the energy that can be injected into the PDO's grid. Based on the project site plot defined by PDO, the bidders were free to design the project size and layout considering the maximum grid injection capacity of 105 MW. Following the Project Proponent's detailed analysis, 218,805 PV modules, each with a rated capacity of 585 Wp, and arranged as 7,545 strings x 29 In series, were considered as the best-case scenario from the energy yield analysis, meeting setback and technical requirements. Considering a buffer between the installed and injected power, the Project was defined with an installed capacity of 105 MW (128 MWp) to meet PDO's requirements. Currently, another option being managed is

the installation of 206,460 PV modules of 620 Wp, reducing the number of PV modules; however, this is not yet confirmed.

- Considering the MFS set by PDO, bidders were asked to identify and configure the solar farm accordingly. After reviewing the latest PV module models available in the market that meet these requirements, the Project Proponent identified, analyzed, and concluded that the best suitable model for the Project should be mono type, bifacial with minimum standard efficiency of 22.65% and operating temperature of about 45ºC, enough to cope with the local conditions. In addition, central inverters were adopted by the Project since these hold a larger capacity than string inverters.
- An option to include a Battery Energy Storage System (BESS) with a higher number of PV modules was also foreseen; however, this option was discarded to reduce footprint of the Project.

Furthermore, the following constraints were considered through the layout and design process of the main components of the Project (i.e. internal roads, PV panel area and laydown areas, collector cable network, and step-up substation):

- solar energy resource: accommodating the maximum number of PV modules within the site boundary established by PDO;
- power grid: designing the layout to maximize ease of, and accessibility to, a connection point into PDO's grid;
- manufacturer specifications: designing within technical thresholds to meet safety requirements of installed equipment;
- physical: locating and designing components to meet required technical specifications but minimize potential impacts on topography, geology, hydrology and landcover. It should be noted that the Project layout and design will integrate the recommendations from the Hydrological Assessment (including a Flood Mitigation Assessment) prepared by Worley Consulting for the Project Proponent in June 2024;
- natural: locating and designing components sensitively to avoid or minimize potential impacts on specific habitats located on site by micro-siting and applying mitigation measures established in this ESIA. It should be noted that the Project layout and design avoided the only tree that occurs on site (*Prosopis cineraria*); and
- social: locating and designing components sensitively to avoid or minimize potential impacts on specific socioeconomic/cultural features located on site by applying the mitigation measures established in this ESIA.

4.5 SOLAR TECHNOLOGY SELECTION

Alternative thermal power technologies (e.g. concentrated, parabolic, etc.) were investigated through a feasibility assessment and, as a result, solar photovoltaic (PV) technologies were selected based on the following benefits:

- Cost effective;
- Low water (non-demineralised) use;
- Low maintenance;
- Relatively suited to dusty environments; and

- Lesser ecological impacts.

Photovoltaic technologies have advantages over Concentrated Solar Power (CSP) technologies. For instance, minimal to no air or waste emissions other than plant construction and low water consumption (as cooling system is not required). The water consumption in PV plants is for panel cleaning mainly. Furthermore, due to their modular design, PV plants can be constructed / upgraded in a relatively short period of time, as compared to CSP plants. Another reason is that there is lesser glare and burn potential to avian fauna than in CSP technologies. Lovich and Ennen (2011) convey that a concentrating solar facility can increase the albedo (i.e. measure of reflected light) of a desert environment by 30%–56%, which could influence local temperature and precipitation patterns through changes in wind speed and evapotranspiration. Depending on their design, large concentrating solar facilities may also have the ability to produce significant amounts of unused heat that could be carried downwind with the potential to create localized drought conditions. The heat produced by central-tower solar facilities can burn or incinerate birds and flying insects as they pass through the concentrated beams of reflected light (McCrary et al. 1986, Pimentel et al. 1994, Tsoutsos et al. 2005, Wilshire et al. 2008).

After reviewing the latest PV module models available in the market, the Project Proponent identified, analyzed, and concluded that the best suitable PV model for the Project was Jinkosolar JKM585N-72HL4-BDV. This model was selected as it is the most powerful and suitable model available at this time for the Project site.

Mono Passivated Emitter and Rear Contact (PERC) panels were selected for the Project (against conventional polycrystalline panels that have a relatively lower efficiency) as they allow panels to convert more sunlight into electricity, making them highly effective even in low-light conditions or on overcast days. As a result, they offer a higher power output compared to Poly solar panels, which are based on older, less efficient technology.

Bifacial panels were selected since they can generate up to 20% more energy than their monofacial counterparts, by harnessing energy conversion on both sides of the panel.

Peak power of the panels considered is about 585 Wp against conventional 500 Wp also improving the net output (standard efficiency of 22.65%).

Considering the site conditions and solar insolation, a single axis tracking system and mounting system were considered that allows a ± 60º tracking range. This system is completely stable against wind induced torsional instabilities up to 70 m/s (the site characteristics show less than this wind speeds in worst cases).

Solar PV Inverters chosen for the system have a maximum efficiency of 99%.

The use of robotic dry-cleaning technique will avoid any freshwater consumption, except as a backup in case of downtime or maintenance of dry cleaning or isolated spoiling of panel surface. The backup wet cleaning will be manual using pressure spray system.

Ground anchors for securing the PV modules are typically one of two types i) pre-cast concrete ‘shoe’ anchors or ii) galvanized steel piles. Piles are either driven or screwed into the ground to a depth of 1.5-2 m. Piles reduce the need for concrete on site and are generally preferred; however, concrete shoes are favored at sites where sub-surface conditions are too difficult for piling/screwing into the ground (such as rock layers or where sensitive material or artefacts exist beneath the surface). It is expected that shallow piling/screwing will be the favored

method for the site. No archaeology has been identified on site meaning both options are viable alternatives.

In addition, anti-reflection PV panels have been considered in the Project in order to be compatible with the operations of PDO's Qarn Alam airport, located at approximately 11 km south. It should be noted that the Project Proponent has obtained a No Objection Certificate (NOC) from the Civil Aviation Authority (CAA) for the development and operation of this Project, in which there is a commitment to use anti-reflection PV panels; no further technical studies (e.g. glint and glare analysis, etc.) need to be conducted as agreed with CAA.

Finally, it should be noted that solar technology is constantly evolving, and the Project will use the most efficient technology available for the site at the time of construction. The exact models to be used will therefore be determined later in the development process. The Project Proponent will make sure the chosen model will not increase the impacts evaluated in this ESIA.

5 STAKEHOLDER ENGAGEMENT

5.1 INTRODUCTION

This section provides a description of the main stakeholders of relevance to the Project and a summary of previous stakeholder engagement activities undertaken. Additionally, the section provides an overview of the stakeholder engagement program that will be implemented by the Project. This program is designed to cover all phases of the Project. The Community grievance mechanism's purpose and procedure is also summarised. This section is complemented by the Project's Stakeholder Engagement Plan (ERM, 2024) presented in Appendix F.

5.2 STAKEHOLDER ENGAGEMENT PRINCIPLES

Engagement with external stakeholders and communities is an integral requirement of the Project Proponent's societal approach. As part of its societal commitment to create value for local communities, the Company aims to build constructive, sustainable relationships with stakeholders, whose support is seen as a key factor in the success of the Company's business. The Project Proponent's community engagement approach is based on:

- Nurturing dialogue with local residents and public and private sector stakeholders;
- Managing the impact of the Company's operations; and
- Contributing to local human, cultural and economic development.

Indeed, the Project Proponent believes that addressing local stakeholders' development priorities and listening to their concerns is key to strengthening the Company's integration into the local community and growing the businesses over the long term. Continuous dialogue helps all parties understand each other's expectations and builds mutual trust.

The Project Proponent understands that effective stakeholder engagement and public consultation is a cornerstone of successful Project development. Therefore, the Company has developed principles for stakeholder engagement to be applied. The principles are based on international best practice guidance and E&P Societal standards.

The key principles guiding the Project Proponent's approach to stakeholder engagement on this Project are:

- Open and Transparent: Information relevant to affiliate activities should be accessible and transparent as possible, providing stakeholders with a comprehensive understanding of Project Activities and how they are or may be affected by them (unless legitimate reasons for commercial confidentiality or the protection of stakeholders required it be kept confidential)
- Listening and Dialogue: Stakeholders should be listened to, their concerns taken seriously, and responses provided in a timely manner to address their concerns.
- Participation: Stakeholders are invited and encouraged to actively engage with the affiliate and its consultants. The affiliate should be inclusive in this process taking into account factors such as gender and cultural considerations and ensuring all stakeholders feel they have an opportunity to share their perspectives.
- Proactive: Relationship-building takes time; start the engagement process early. Provide information in advance of consultation activities and decision-making points. Ensure that potential risks and impacts are communicated proactively with stakeholders.

- Impact-focused. During the impact assessment process, engagement with PACs is focused around the potential and actual negative project impacts that may concern them in order to jointly identify appropriate avoidance and mitigation measures. Other stakeholders indirectly affected by Project impacts are also consulted.
- Safe Participation: Steps are taken by the Company towards ensuring any stakeholder that participates in any form of engagement can do so in a safe and protected manner without risk or fear for retaliation (for example through the use of trusted third parties, individual meetings or group meetings)
- Effectiveness: Information and forms of engagement should be acceptable and effective for the individuals for whose use they were intended. Information and forms of engagement should be accessible, legitimate, transparent and Human Rights-compatible.
- Appropriate form of engagement: Different forms of engagement may be required for different kinds of stakeholders and different purposes. Information provided to stakeholders should be provided in an appropriate format to the stakeholder in question considering the potential need to provide assistance for the interpretation of technically complex information. Wherever possible, stakeholders should be engaged directly. Where this is not possible because it may threaten their safety, engagement should occur through legitimate and credible representatives.
- Empowering and responsive: Engagement should empower stakeholders to make their voices heard. This includes clearly informing stakeholders of what they can expect in terms of feedback and responses to their inputs.
- Equal and Human Rights respectful: Everyone, without discrimination, has the right to participate on equal terms. This includes a responsibility for the affiliate or entity to ensure a gender sensitive approach to engagement is implemented and to identify the need for any special measures to ensure that vulnerable individuals and groups are inclusively engaged.

5.3 STAKEHOLDER IDENTIFICATION

Stakeholders include individuals or groups that may influence or be impacted by the Project, described as follows:

A stakeholder is any person, group of persons, or organization on which the Project (or activity) has an actual or potential, direct or indirect, positive or negative impact, or one that has an actual or potential, direct or indirect, positive or negative impact on the Project (or activity).

The level of interest and impact of any given group of stakeholders is dependent on a number of factors including level of authority, socio-economic context, influence, education and cultural factors.

Stakeholder identification began at Project inception and planning and has continued through the various stages of the Project development.

Stakeholders identified to date represent the organisations and individuals who may be directly or indirectly (positively or negatively) affected by the Project or who may have an effect on how the Project is implemented.

Stakeholders identified to date for inclusion in engagement activities meet one of the following criteria:

- Have an interest in the Project;
- Would potentially be impacted by or have an influence on the Project (negatively or positively); and/or,
- Could provide commentary on issues and concerns related to the Project.

Stakeholders were categorised, based on their various needs, interests, and potential influence on the Project as outlined in Table 5.1 below.

TABLE 5.1 STAKEHOLDER CATEGORY LIST

Stakeholder Group		Role/Connection to the Project	Project Phase
Project affected parties			
Local community	Residents of Abu Thaylah	Lying within the AoI, these stakeholders will require timely engagement prior to and during each project phase.	• All (with attention to consider pre-phase disclosures)
	Users of roads nearby	Shared road network and potential traffic related impacts	• Construction phase
	Camel and goat owners that potentially may use the site during raining seasons	Users of the project site and its surrounding areas for seasonal grazing and potential landscape changes	• Construction and operation phases
Local Government	Wali of Adam	The government's official representative of the Wilayah with connection with the local community	• All (with attention to consider pre-phase disclosures)
Concession owner	Petroleum Development of Oman	Project Beneficiary	• All
Project workers	Project workers include those directly employed, as well as those employed by Project contractors	Project workers are key to the success of the Project. Their working conditions and labour rights are impacted by how the Project manages its workers and contractors.	• All
PDO personnel	PDO's personnel and contractors working and/or living within the AoI	• There are no permanent PDO personnel camps within the AoI (15 km). Personnel may occasionally enter the AoI to service the established wells and/or to drill new wells in the future. • Areas of interest/ impact may include disturbance due to traffic from construction activities and logistics from oversized loads (i.e., solar panels) and HSE related risks and incidents.	• All
Other interested parties			
Institutional Environmental Authorities	Environment Authority	• Local environmental authority and regulator required to be engaged with throughout the Project lifecycle.	• All

Stakeholder Group		Role/Connection to the Project	Project Phase
Government Entities	Ministry of Agriculture, Fisheries and Water Resources (MAF)	• Central Government Authorities (Ministries in Muscat and/or their Regional Offices) are of primary political importance to the Project in terms of establishing policy, granting permits or other approvals, and monitoring and enforcing compliance with Omani Law throughout all stages of the Project life-cycle. • These Ministries may hold relevant baseline data for the Project area.	• Current
	Ministry of Labour		
	Ministry of Transport, Communications and Information Technology		
	Ministry of Social Development		
	Ministry of Health		
	Ministry of Heritage and Tourism		
	Ministry of Education		
	Ministry of Higher Education, Research and Innovation		
	Ministry of Housing and Urban Planning		
	Ministry of Justice and Legal Affairs		
	Directorate General (DG) offices of Ministries.		
	Civil Defense and Ambulance Authority (CDAA)		
Aviation Oversight Authority	Civil Aviation Authority (CAA)	The Civil Aviation Authority (CAA) is responsible for ensuring air transport safety and monitors aviation operations. A No Objection Certificate (NOC) has been obtained from CAA, in which the Project Proponent has committed to use anti-reflection panels.	• Current
Local level community representation	Majlis As Shura Adam	The people's representative of communities within the Wilayat	• All
	Municipal Council Adam	The people's representative in the Municipal Council for the Wilayat	
NGOs	Omani Women's Association Adam	An active community organization in the wilayat	• All

Stakeholder Group		Role/Connection to the Project	Project Phase
		for the development of women in the Omani society under the supervision of the Ministry of Social Development	

Source: 5OES, 2024

5.4 ESIA CONSULTATION ACTIVITIES

As part of the Project disclosure and social baseline data collection for the ESIA, extensive stakeholder engagement was undertaken.

5.4.1 BASELINE AND DISCLOSURE APPROACH

Stakeholder engagement during the ESIA phase consisted of (i) briefing Project stakeholders on the details of the Projects and the ESIA process, the associated timeline; (ii) consulting stakeholders of the Projects on the potential impacts of the Projects on their living conditions and their activities to collect their opinions, concerns, and suggestions; and (iii) collect primary socio-economic data to inform the ESIA.

Table 5.2 presents the locations where field work has been conducted to collect primary data through the settlement profiling, and to carry out the correspondent engagement with stakeholders through Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs), to collect their feedback and concerns. Engagement activities presented in were undertaken on 14 July 2024, through FGDs and KIIs with local Authorities and community representatives to collect information and views of the key stakeholders. Interaction with PDO will take place to share the Stakeholder Engagement Plan, and engagement with PDO workers will be discussed with PDO representatives to ensure their feedback is also gathered.

The purpose of the meetings was to engage with key stakeholders and local community representatives to disclose the Projects at this stage, and collect feedback, especially about their concerns regarding the Project's potential impacts. In addition, where available, environmental and socio-economic data and information was sought.

Specifically, the types of engagement activities that have been conducted include the following:

- Key Informant Interviews and Focus Group Discussions:
    - KIIs were undertaken to collect governorate/Wilaya and community level information from National, District and local authorities specifically about population data, land use and other to inform the baseline.
    - FGD have been organized with Omani Women's Associations in both wilayat to collect information and informed opinions on key socio-economic aspects for the communities and to get additional general information on baseline conditions.
    - KII/ FGD have also addressed the presence and potential impacts on indigenous groups in the AoI of the Project. Following engagement, it was concluded that no groups that meet the criteria as defined by the IFC Performance Standard 7 are found in the area. Albeit their linguistic and cultural differences, all communities living in the Project area can be considered mainstream communities.

- Ground truthing and Field Observations: Field team visited key locations where KII and FGDs have been conducted.

For the ESIA, a total of two KII and one FGD were conducted in July 2024.

TABLE 5.2 ESIA BASELINE SURVEYS AND PROJECT DISCLOSURE CONDUCTED

	Location/Venue	Stakeholders attending	Type of engagement (KII/FGD)	Date
1	Wali of Adam	• Wali • Deputy Wali • Member of Al Shura Council • Members of Municipal Council • Director of the Municipality Department in Adam • Planning Specialist at the Wali's Office in Adam	KII	14.07.2024
2	Omani Women's Association (OWA) of Adam	• President of the OWA • Deputy President of OWA • OWA Members	FGD	14.07.2024

Although the Sheik of Abu Thaylah was invited to attend the KKI on 14 July, he was unable to attend.

5.4.2 SUMMARY OF KEY ISSUES/ CONCERNS EXPRESSED DURING BASELINE AND DISCLOSURE CONSULTATIONS

This section presents a summary of the main issues and concerns raised by the stakeholders engaged with. Table 5.3 provides a summarized overview of the feedback from all stakeholders engaged with during the baseline development and project disclosure consultations (conducted in July 2024).

Initial feedback from all stakeholders was overwhelmingly positive, recognizing the benefits these projects bring to the Petroleum Development Oman (PDO), the nation's leading exploration and production company with a 60 percent government interest.

While the potential impacts were noted, they did not lead to significantly in-depth discussions on any. Stakeholders referred to recent wind and solar projects in the region, reaching a consensus that there were no major negative impacts from these projects from their perspective.

The primary focus of discussions with stakeholders was the benefits of the Project. There is a general pre-existing expectation that oil and gas companies operating in the area should invest locally in various ways. However, it is acknowledged that oil and gas companies often have their own protocols, standards, and strategies for social investment, which may not always align with the community's desired level or means of socio-economic contribution.

Employment remains a national priority, with each Wilayah aiming to reduce the number of registered jobseekers. This expectation is an important consideration for all stakeholders involved.

TABLE 5.3 OVERVIEW OF FEEDBACK, CONCERNS AND QUESTIONS RAISED BY GOVERNORATE REPRESENTATIVES DURING BASELINE AND DISCLOSURE CONSULTATIONS

Subject	Ad Dakhiliyah
Project's perception	• Overall positive welcoming of the project • Query regarding location selection rationale and if the Project would meet PDO's energy requirements.
Local economy and livelihoods	• The primary sources of income include selling camels and private sector jobs in oil and gas companies operating in the area. • Employment rate amongst residents of the Wilayat is dependent on the opportunity/ role. Some residents have Master's and PhD qualifications. • Oil and gas companies use a centralized system for employment which does not enable prioritization for local employment
Community land uses (e.g., grazing, access rights)	• Residents of Abu Thaylah graze in the area of the Project site. However, the importance of the Project site as a grazing area could not be confirmed by those attending the stakeholder's meeting.
Community health, safety and development needs	• Dust and traffic related accidents, sometimes involving camels with suggestions to install road fencing.
Unique regional culture and heritage (e.g., language, traditions of local tribes, handicrafts)	• It was confirmed that the predominant tribe in Bu Thayla and Sayh An Nuhaydah is Al-Durai. • It was clarified that there are no archaeological sites in the area.
Environmental, Health and Social Impacts	• Query on the environmental impact and impact on nearby residents and their camels as well as expected benefits to the nearby settlements. • Anticipation of various benefits, including employment, provision of electricity and other contributions to the communities.
Project Social Investment and Responsibility	• Emphasis on the importance of focusing on social and economic returns/benefits to the Wilayah, with priority to locals and LCCs • Extending the project's output supply to serve the nearby settlements is suggested
Stakeholder Engagement	No Feedback received
Grievance mechanism	• Suggestion to involve members of the municipal council in the grievance mechanism.

Source: 5OES, 2024

5.5 CONSIDERATIONS FOR FUTURE STAKEHOLDER ENGAGEMENT

The following considerations for future engagement are proposed:

5.5.1 WITH REGARDS TO THE APPOINTMENT OF A COMMUNITY LIAISON OFFICE (CLO):

This person should be a neutral individual, ideally recruited from the local community, who speaks the dominant local languages, English and Arabic, and should be proven not to have a vested interest in a particular outcome. This person will need to be acquainted with the stakeholders and stakeholder process as outlined in the SEP, including a clear understanding of the Project schedule and engagement milestones in order to inform stakeholders appropriately about the development of the Project. The CLO will have direct contact with OQAE and coordinate liaison activities. The EPC Contractor will also recruit a CLO. The CLO will need to consider the grievance mechanism gender dynamics in the communication channels and to ensure that women and vulnerable groups are properly engaged and have a suitable recourse to voice complaints. Details on the responsibilities of the Project Proponent and EPC Contractor CLO are provided in Section 8 of this plan.

5.5.2 WITH REGARDS TO PLANNED ENGAGEMENT DURING THE ESIA DISCLOSURE PROCESS:

Before the public consultation on the draft ESIA, the draft technical summary in Arabic should be disclosed to all concerned parties. It is recommended that the English version of the ESIA be available on the Project website. These meetings will be suitably advertised and interested individuals and organisations will be invited to hear about the Project, review information, talk to members of the Project and the ESIA teams and provide comments on the Project and its impacts. All comments, questions and other input from the public will be logged and then considered by both the Project and the ESIA teams. Where feasible and relevant, changes will be made in the Project planning/design/ implementation to address concerns raised. These changes will be reflected in revisions to the Project design as appropriate, and the revised final ESIA Report. In addition, a brief summary of the key comments received during disclosure and how these comments are reflected/will be reflected in the Project design and the final ESIA Report will be included in the SEP.

5.5.3 WITH REGARDS TO POST ESIA STAKEHOLDER ENGAGEMENT:

Information gathered during post-ESIA engagement and consultation events, should inform the development of the environmental and social management plans, prepared as part of the Projects' Environmental and Social Management System (ESMS).

To formalize follow-up engagement activities post-ESIA, a round of engagement meetings will be undertaken. It is important to hold these meetings within two to three months prior to the start of construction activities. This will include the following:

- Formal engagements with PDO, EA, ROP, national service providers, Walis, community representatives (as necessary) to present the Project SEP and planned engagement activities over the coming phases of the Project as well as updated Project information.
- Community meeting(s) with representatives of communities in the AoI convened at an accessible location.

5.5.4 WITH REGARDS TO SITE PRESENCE AND ONGOING STAKEHOLDER ENGAGEMENT:

To ensure that the Project is accessible to all stakeholders, the EPC Contractor will have offices within the Project site. Project Proponent's CLO and the EPC CLO will be based on site, at an accessible location. Public notice board will also be displayed (if and where possible) at agreed locations for example in the settlements of Abu Thaylah and Al Ghaba, to guide any interested or affected parties who need more information or want to submit grievances.

Engagement during Site Preparation, Construction, Pre-commissioning and Commissioning will be conducted at regular intervals, which will be defined based on the level of concerns and expectations of stakeholders. It will be focused on informing and updating stakeholders most notably community members about the Project site preparation, construction, pre-commissioning and commissioning activities and schedule. The regularity and the approach to the engagement proposed below will seek alignment with PDO who also carries out regular engagement with stakeholders for other purposes). The engagement shall include:

- Face-to-face information dissemination, consultation, and coordination meetings with local leadership and other key authorities.
- Focus Group Discussions for vulnerable and special interest groups with particular concerns such as camel and goat owners, or community members using or crossing the AoI.
- Face-to-face coordination meetings with relevant stakeholders in the area to manage construction impacts, in particular from road transportation and approaches to local employment.

Information dissemination tools in addition to the public notice boards (*e.g.,* flyers) will continue to be used to support the above activities.

Throughout the Project lifecycle, the consultation and engagement process should bring into consideration the existence of vulnerable groups. Ensuring that these groups are adequately considered in the engagement activities and that their views and concerns are taken into account during the engagement process is critical to ensure these are not further victimised and they are able to benefit from Project opportunities. A list of different strategies to capture vulnerable groups' views throughout the Project is presented in Appendix F.

Specific planning and engagement activities will be necessary at each Project phase. These are presented in Project's Stakeholder Engagement Plan – in Appendix F.

The activities that will be ongoing throughout the entire Project cycle and are therefore common to the different phases include the following:

- Regular update of the Non-Technical Summary (NTS) as the Project moves forward and activities, schedules and milestones evolve.
- Regular update and revision of the stakeholder register including stakeholder analysis and re-evaluation as necessary throughout the different Project phases.
- Addressing comments, questions, and grievances regularly and through appropriate channels, and issuing information to stakeholders. This includes regular refreshers to stakeholders about the Grievance Mechanism and related processes.
- Regular reporting to the different stakeholders as appropriate.
- Regular Project Monitoring reports.

5.6 GRIEVANCE MECHANISM

The objective of a grievance mechanism procedure is to ensure that all comments and complaints from any project stakeholder are considered and addressed in an appropriate and timely manner.

Both the Project Proponent and contractors must be committed to avoiding, reducing, limiting and, if necessary, remedying any adverse impacts caused by their activities on local populations and on their social and physical environment. One of the tools for identifying, preventing and managing unanticipated impacts is a GM.

The grievance mechanism will deal with suggestions, concerns, and grievances related to any issues arising from Project specific activities. The grievance mechanism is not designed to obstruct access to other judicial or administrative processes that are available under Omani law.

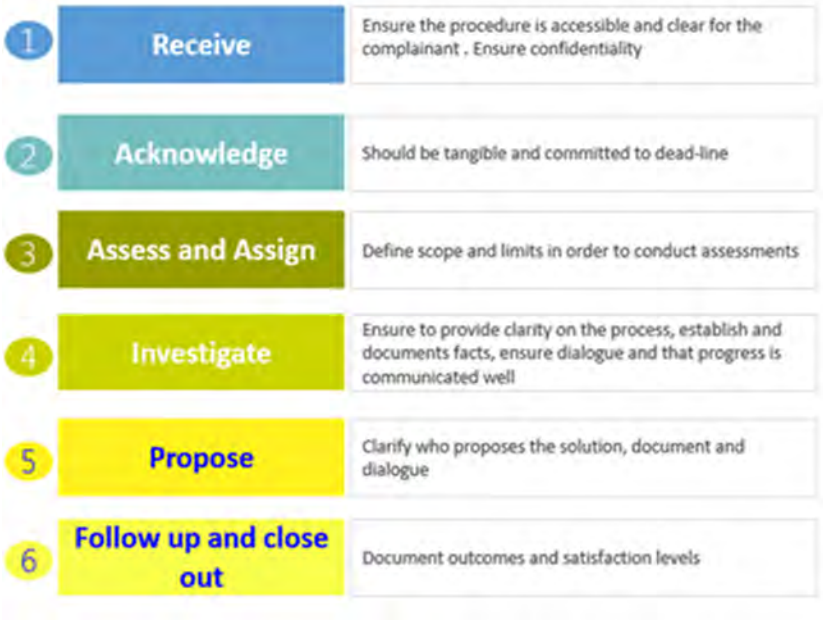
Grievances are complaints or comments (or questions/suggestions) related to the way a project is being carried out. A mechanism for resolving these grievances constitutes a permanently open official channel, through which stakeholders can exchange with the promoter and its service providers, while the follow-up of grievances warns of the existence of conflicts or disputes in progress. exacerbation. The establishment of such a mechanism is required under the EP IV and IFC PS.

Identifying and resolving grievances builds positive relationships between the project developer, communities and other stakeholders. For effective management, the components listed in the box below should be integrated. The structure of the Grievance Mechanism developed for the Project follows the recommendations of good practices in force.

5.6.1 GRIEVANCE PROCEDURE

The grievance procedure in Figure 5.1 is proposed to ensure an effective and timely response to community complaints and maintain good community and stakeholder relations. The six phases that constitute the grievance procedure are represented in Figure 5.1. These consist of:

FIGURE 5.1 GRIEVANCE MECHANISM PROCEDURE



Source: TTE, 2020

Further detail is provided in the Project's Stakeholder Engagement Plan (ERM, 2024).

5.7 MONITORING AND REPORTING STAKEHOLDER ENGAGEMENT ACTIVITIES

It will be important to monitor and report on the on-going stakeholder engagement activities to ensure that the desired outcomes are being achieved, and to maintain a comprehensive record of engagement activities and the issues raised.

The success in the implementation of the SEP will be monitored by the Project Proponent throughout the Project life cycle against the following sets of criteria:

- Continuation of the consultation process throughout the Project life cycle, maintaining active lines of communication and disclosure of Project information and phasing through the identified channels at the established frequency with all key stakeholders.
- Regular review and maintenance of the Grievance Redressal Mechanism, ensuring grievances, if any, are addressed involving affected men and women, including host communities, through mutually agreeable solutions.
- Inclusion of disadvantaged or vulnerable individuals and groups, with necessary actions to ensure that these groups are fully informed and aware of the Project.

There are two methods through which the stakeholder engagement process will be (and has been) monitored:

1. **Review of engagement activities in the field:**
   - During engagement with stakeholders, the Project Proponent/ESIA team will follow a semi-structured focus group discussion by asking questions to participants, depending on the stakeholder group, to ensure that messages are being conveyed clearly between the Project team and stakeholder(s).

- The Project Proponent/ESIA team will conduct debriefing sessions while in the field. This method will be used to assess whether the required outcomes of the stakeholder engagement process are being achieved, and to provide the opportunity to amend the process where necessary.
- The approach to engagement and messages to be used will also be discussed with Project staff to gain their feedback.

2. The use of engagement tools developed through the ESIA engagement including the:

- Stakeholder register; and
- Meeting records of all consultations held.

5.7.1 DATA MANAGEMENT

In order to record activities, assess the effectiveness of the Stakeholder Engagement Plan and associated community dialogue activities, the Project Proponent will implement a data management and monitoring process. Stakeholder engagement activities will be documented and filed in order to track and refer to records when required and ensure delivery of commitments made to stakeholders.

The following stakeholder community dialogue records and documentation will be used and maintained:

- Stakeholder register
- Stakeholder engagement log
- Commitments register
- Meeting minute template
- Grievance log

5.7.2 INTERNAL AND EXTERNAL REPORTING

The following internal reports will be developed:

- Red Flag Reports: Weekly reports for urgent items or incidents of significant nature. These red flag reports will be prepared by the Project Proponent CLO in collaboration with the EPC CLO and sent to the Project Proponent's HSES Manager or nominated Manager in charge, which will take action and/or escalate if necessary.
- Quarterly Progress Reports: Internal quarterly progress reports will be prepared by the Project Proponent's CLO in collaboration with the EPC CLO. These reports will summarise:
  - Engagement activities undertaken this far: stakeholders met, key topics discussed, main concerns and expectations, positioning towards Project activities;
  - Grievance mechanism: Number of grievances received their nature, how they were tackled or the progress of their resolution, and whether there are measures that were agreed to be taken;
  - Social license risks to the Project;
  - Limitations (e.g. resources, internal alignment); and
  - Priorities for next quarter.

These reports will be discussed at quarterly meetings and will be circulated internally as required.

In addition, as an integral step in building relationships with stakeholders and promoting understanding between the Project Proponent and its publics, it is recommended to keep track of commitments made (commitments tracker) with stakeholders and to communicate progress made against these commitments on a regular basis (for instance during regular meetings with the community representatives).

6. BASELINE CONDITIONS

6.1 PHYSICAL ENVIRONMENT

6.1.1 OVERVIEW

The area to be studied during the assessment is established by identifying the Project Area of Influence (AoI). This section establishes the existing conditions (i.e. baseline) of the AoI to enable the assessment of potential Project-related impacts on the receiving physical environment.

The baseline was characterised by sourcing information and data from secondary sources (official websites and reliable data sources), and primary data collected through engagement with key stakeholders and field surveys in and around the Project site.

6.1.2 AREA OF INFLUENCE (AOI) AND STUDY AREA

The AoI has been determined taking into account the following factors:

- Physical extent of the proposed works, as defined in the Project Description;
- Nature of the baseline environment and the manner in which the impacts are likely to be propagated; and
- Pattern of governmental administrative boundaries, which provide the planning and policy context for the project.

The following factors have been considered when determining the AoI, and for each aspect of the baseline the area of influence is presented as a map (Figure 6.1):

1. The physical extent of the Project's components (i.e., the solar farm's direct footprint) during construction, operation and decommissioning phases;
2. The spatial extent that impacts and risks affected by the project (i.e. the 'influence') during construction, operation and decommissioning phases (defined by impacts which are likely to be propagated beyond the Project boundary depending on project and site specific activities and conditions).

Table 6-1 provides a description of the AoI considered for each physical environment component. The Physical AoI includes the footprint of the core components of the Project (PV solar plant, internal roads, the step-up substation and site offices), associated facilities (access road to the site, overhead powerline connecting the project substation to PDO's substation), and a buffer around this footprint which includes all potential areas where project can have direct or indirect impacts during construction, operation, or decommissioning and areas to cover potential micro-siting of the Project components.

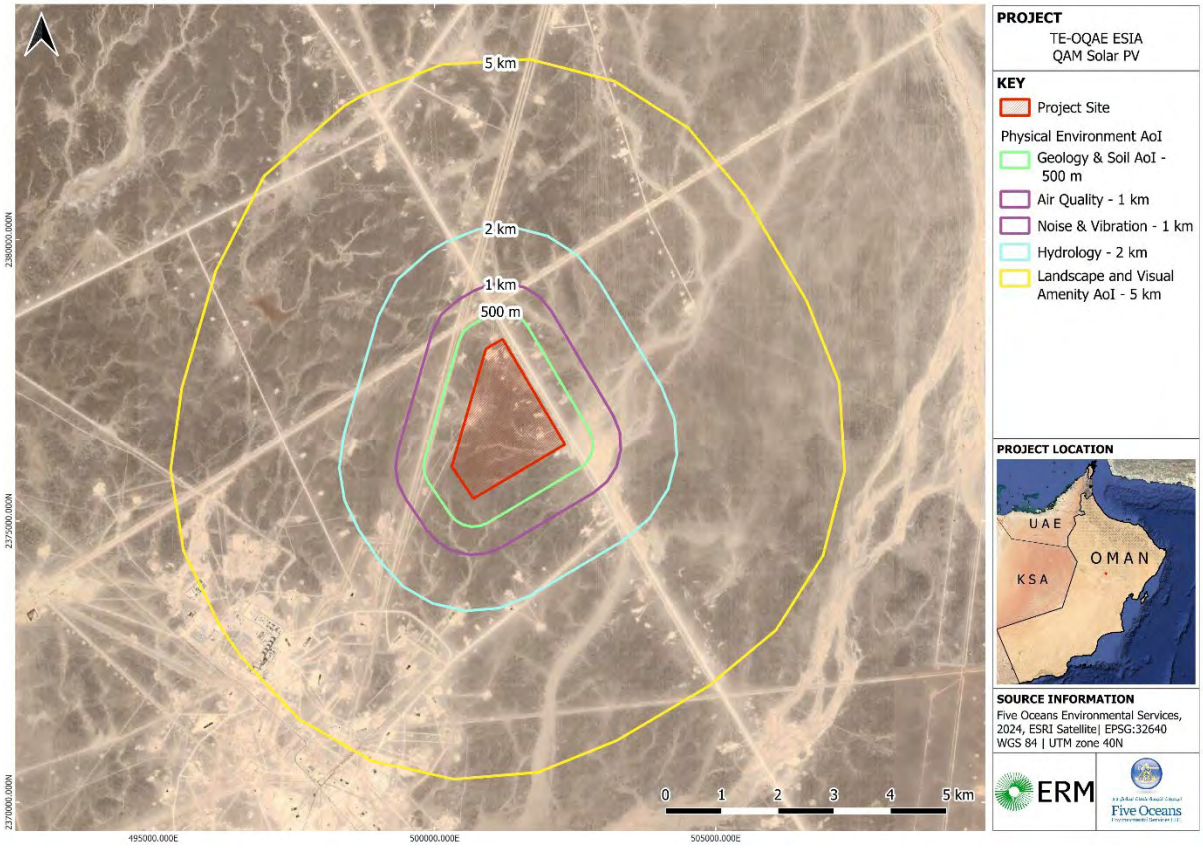
TABLE 6-1 ANALYSIS OF AOI FOR PHYSICAL ENVIRONMENTAL COMPONENT

Environmental component	AoI Description
Climate and Weather	Regional

Environmental component	AoI Description
Air Quality	The impact of air emissions will extend downwind of the Project site. Impacts to air quality are only expected to occur during construction of the Project. Pollutants of concern include particulate matter from site clearance activities, and gaseous emissions (including VOCs) from vehicles, machinery and equipment. In the context of dust emissions, evidence-based guidance from the Institute of Air Quality Management (IAQM) (2016) indicates that the majority of dust impacts would occur within 350 m of the site boundary and 500 m from the site entrance. Other emissions to the atmosphere would only be expected to cause discernible impacts to any nearby receptors (e.g., <200 m for gaseous emissions). **An AOI of 1 km** has, therefore, been considered for the Project, to account for worst case scenarios and cumulative effects. In addition, there are limited air quality receptors for the Project. There are no permanent settlements within 1 km of the Project site. Whilst the area is accessed by camels for grazing, grazing on site is infrequent and short-term and therefore not considered further. Construction personnel will be located within the Project site boundary and may be exposed to increased dust emissions.
Noise and Vibration	Propagation of sound from a source depends on a few factors such as the level and frequency of sources, type of terrain, distance, weather conditions and barrier effects. Generally, sound pressure levels and vibrations attenuate (reduce) proportionally with distances from source. In relation to the Project, the expected **AOI is 1 km**, to account for construction related noise and vibration, noting that limited noise will be emitted during the project's operational phase. There are limited noise and vibration receptors for the Project, since there are no permanent settlements within 2 km of the Project boundary. The area is grazed by camels, but since they are free ranging and can avoid the area livestock are not considered as a sensitive receptor for project generated noise.
Geology and Soil	The identified geology and soil receptors are soil structure and soil quality within the areas that underlie the Project site. The soil at the Project site is typical of the soils in the surrounding areas and does not have any particular value, uniqueness or importance. The potential impacts to **geology and soil** during construction will be limited to areas inside the Project site and any associated temporary facilities. During operation, the **AOI considers the Project site** and surrounding areas where, should it occur, any contamination may be transported via wind or water mediated transport mechanisms (i.e., blown by wind or carried by runoff). **The AOI for geology and soil is set at 500 m**.
Groundwater	Groundwater is not considered susceptible to impacts from the Project and will not be abstracted for use by the project.

Environmental component	AoI Description
Hydrology	The AOI for the Project includes any drainage lines **within the Project site and those located downstream of the Project site runoff areas.** The receptors therefore include the existing hydrology, including drainage channels of the Project as well as the components of the Project itself. **An AOI of 2 km** has been applied since the site has low flood risk and catchments drained by wadis and drainage lines are small.
Landscape and Visual	Key considerations determining the area of influence for impacts landscape and its visual amenity include the landscape character of the project area, and the location of any receptors in the viewshed (zone of theoretical visibility, ZTV) around the Project. Since the project consists of low elevation structures, the ZTV is estimated to be 5 km, and this is used to define the **landscape AOI of 5 km**.

FIGURE 6.1 PHYSICAL ENVIRONMENT AOI



Source: 5OES, 2024.

6.1.3 CLIMATE AND WEATHER

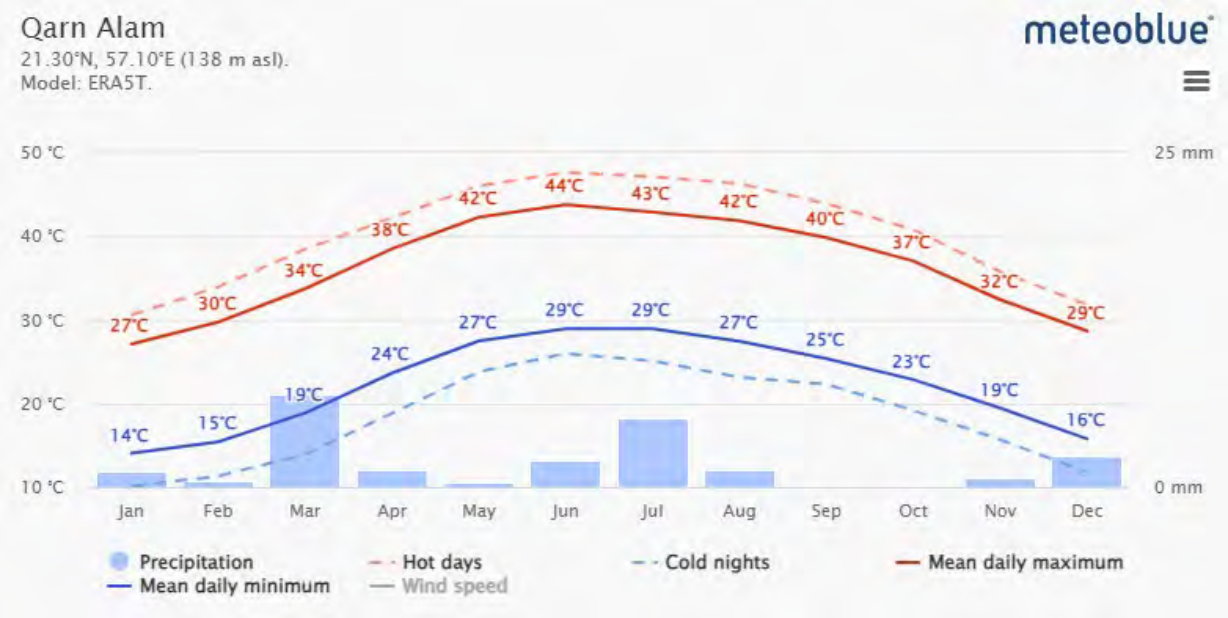
Oman is a hyper arid country with the majority of the country experiencing hot, dry summers and cool, dry winters. The climate of the region is dry with large seasonal and daily variations in temperature; rainfall is irregular with large variations between years. Oman has been

classified under the Köeppen-Geiger climate classification system as BWh – hot arid desert (World Bank Group (WBG), 2021).

The project area is hot and hyper-arid with low humidity. Mean maximum daily summer (May-October) temperatures can exceed 44 ºC while winter (November-April) temperatures can reach minima of 11 ºC. Precipitation is infrequent and limited, usually occurring between March and August. Average wind speed is highest (13 km/h) in summer and typically blows from the southeast. A summary of meteorological conditions at Qarn Alam is given in Figure 6.2 and is based on meteorological data from the government meteorological station at Qarn Alam, 18 km to the SE of the project site (Figure 6.3).

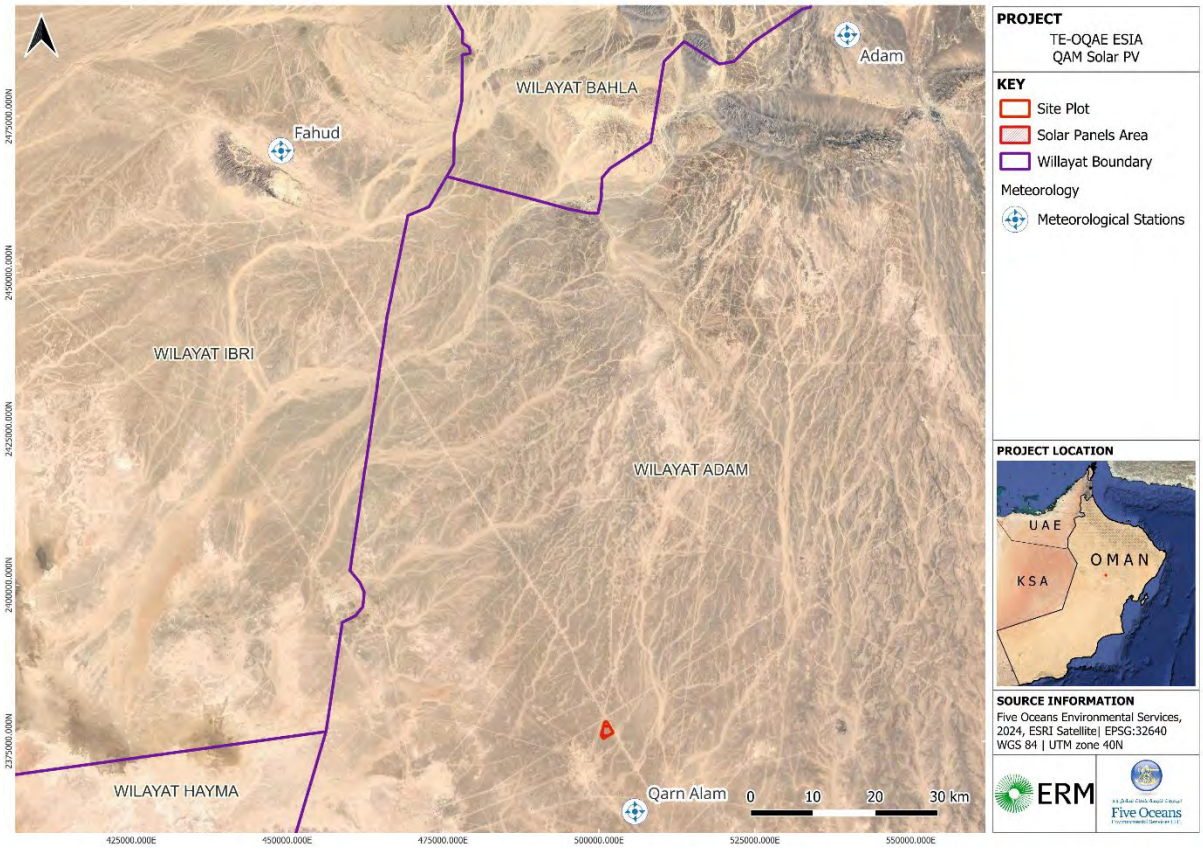
The project lies in the central deserts of Oman in an area influenced by the NE monsoon which occurs in winter months (November to April), when cold air masses that form on the Steppes of central Asia are drawn along the axis of the Arabian Gulf (and elsewhere) by widespread low pressure in the Gulf region. Typically, these events, known as shamal winds, last for 3-5 days and affect the Gulf, the Gulf of Oman, and northern Oman occasionally reaching the project site and further. Shamal winds affecting Qarn Alam blow down the axis of the Arabian Gulf, and over the low lying western deserts of UAE into the deserts of northeastern Oman, so are not affected by the Hajar Mountains. While Qarn Alam is over 150 km from the Arabian Sea, it is periodically influenced by humid air masses associated with the SW monsoon during the summer months (June to August) which split off from the main wind field and blow over the central deserts, resulting in humid conditions and very occasional rain.

FIGURE 6.2 OVERVIEW OF METEOROLOGY AT QARN ALAM



Source: https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/qarn-alam_oman_286909 (Accessed July 2024)

FIGURE 6.3 METEOROLOGICAL STATIONS IN THE VICINITY OF THE PROJECT AREA

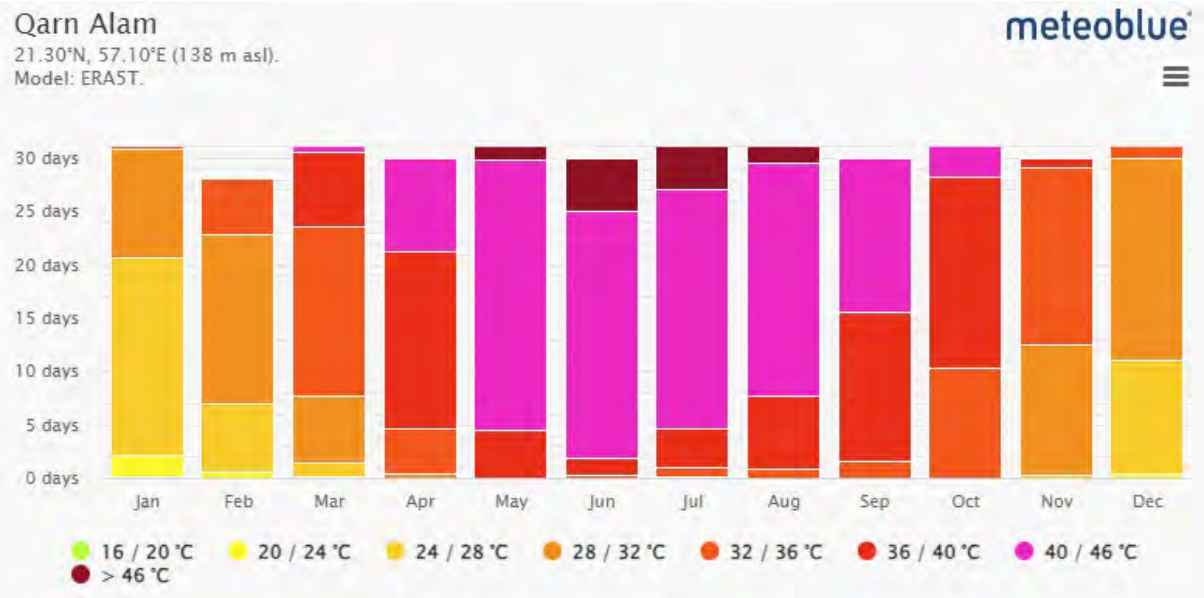


Source: 5OES, 2024.

6.1.3.1 TEMPERATURE

Meteorological data at Qarn Alam indicates a mean annual temperature is 28.5 °C with a maximum of 47.9 °C and a minimum of 7 °C (hourly temperatures). The distribution of ambient air temperature at Qarn is shown in Figure 6.4 and clearly shows how temperatures change over the year, with winter months (December and January) having moderate temperatures of 20 – 28 °C, and summer months (from May to August) experiencing temperatures from 36 to more than 46 °C. The number of days of more than 46 °C peaks in June, with around 5 days, but these extreme temperatures also occur in May, July and August. High temperatures are important as they define the operating conditions for equipment on site, including the solar panels themselves which are less efficient at higher ambient temperatures.

FIGURE 6.4 ANNUAL DISTRIBUTION OF TEMPERATURE AT QARN ALAM



Source: https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/qarn-alam_oman_286909 (Accessed July 2024)

6.1.3.2 PRECIPITATION

Annual rainfall averages are given in Figure 6.2 which indicate some seasonal patterns in precipitation. Rain falls infrequently at Qarn Alam, tends to be more frequent in December and March (during the onset and wind down of the NE Monsoon), and also in the summer months (June to August) during infrequent rain fall events. Although rain is rare during summer months, storms can be intense and therefore influence the annual average rainfall figures.

The distribution of wet and dry days at Qarn Alam is given in Figure 6.5, which shows that the majority of days on site are dry, with only a minimal number of wet days per month. These figures should be interpreted in terms of the likelihood of wet days per month since they are based on long term meteorological data and so are averages over a long period (see Figure 6.6 for long-term rainfall patterns for weather stations in the Oman's northern central deserts). Oman generally experiences cycles of drought and slightly wetter weather, which results in long periods, sometimes multiple years, with less than average long term rainfall, and this pattern can be expected at Qarn Alam.

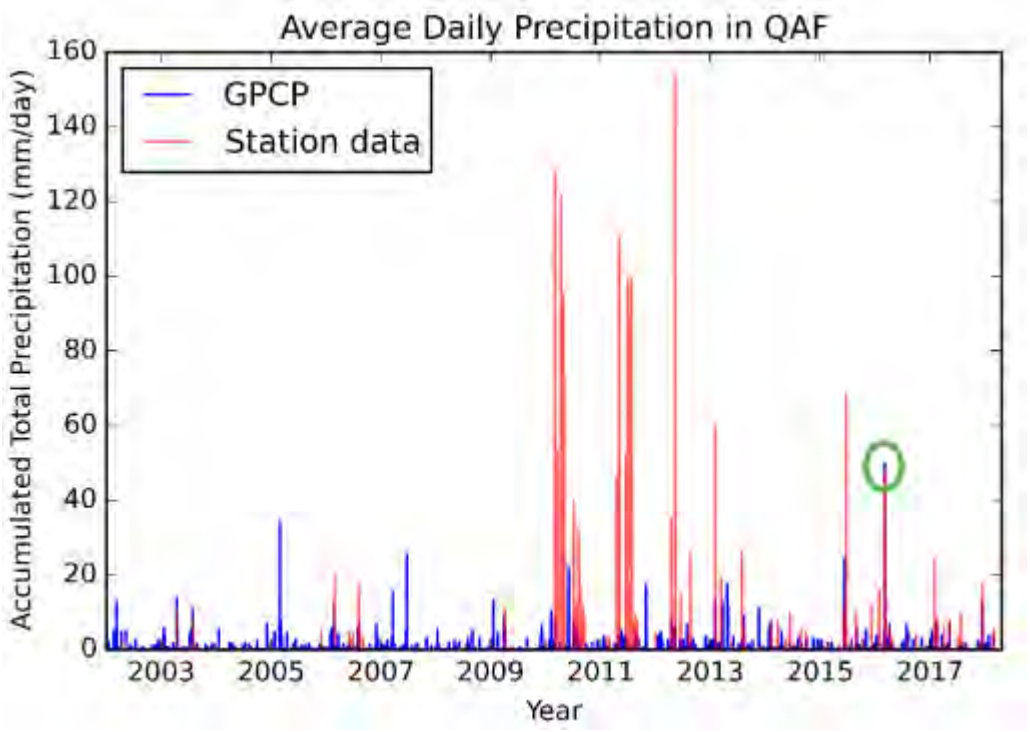
FIGURE 6.5 DISTRIBUTION OF DRY AND WET DAYS AT QARN ALAM

Source: https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/qarn-alam_oman_286909 (Accessed July 2024)

Rainfall records for Qarn Alam (1983 – 2018) have been analysed by Khatab (2018), a period of 35 years, and over this period there have been six rainfall events with more than 25 mm in a 24 hr period, the most intense of which, on the 24 June 2016, resulted in 63 mm of precipitation. The study matched historical observations with five climate change models, and concluded that central Oman can expect 5 – 10% increase in extreme rainfall events in future (2035 – 2065) compared to the historic baseline for which high quality data exists (1999 – 2005), with the threshold for extreme events being +40 mm of rain in 24 hrs.

Khatab's (2018) analysis indicates that conservatively 10% should be added to the basis of design for storm water drainage systems, i.e. the return period for design storms should be increased (e.g. from 50 yrs to 55 yrs) to account for predicted changes in rainfall intensity associated with climate change.

FIGURE 6.6 ACCUMULATED RAINFALL FROM THREE STATIONS (QARN ALAM, ADAM AIRPORT AND FAHUD)



Note: QAF – Qarn Alam, Adam airport, and Fahud (see Figure 6.3 for locations of meteorological stations referred to here. GPCP – Global Precipitation Climatology Project

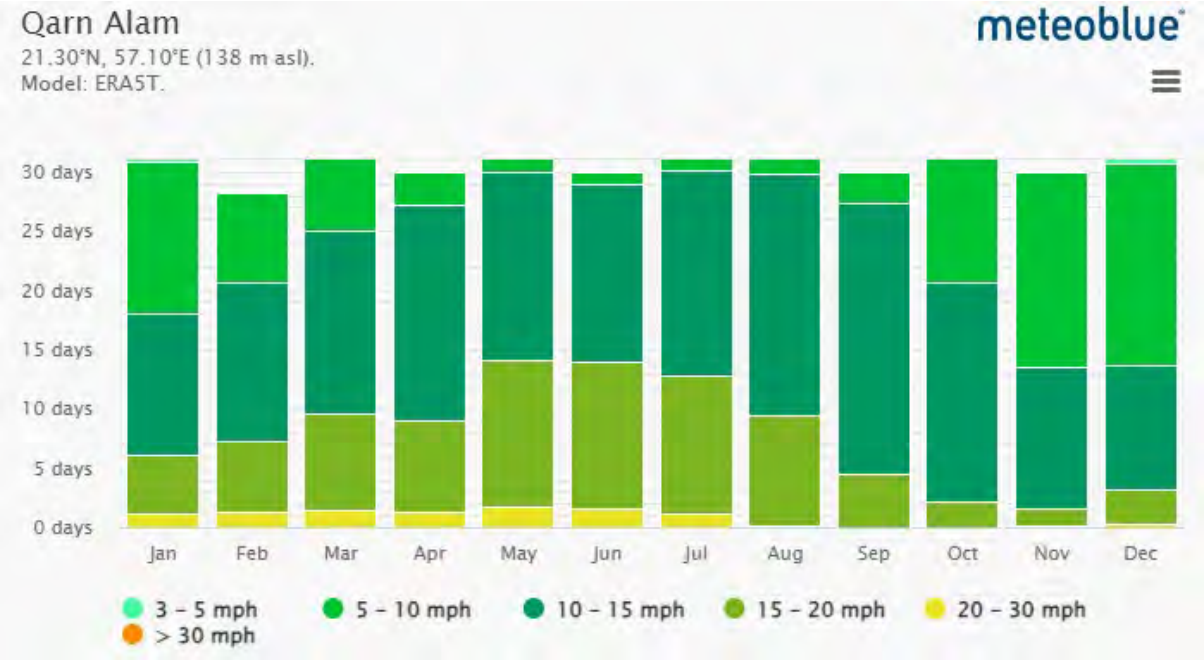
Source: Khatab (2018)

6.1.3.3 WIND

Simulated historic wind data for Qarn Alam is available on Meteoblue website[1] which is based on the available data from the government weather station at Qarn Alam, with data gaps filled and the data set extended using modelled data. Figure 6.7 shows the number of days experiencing different wind speeds by month at Qarn Alam. This demonstrates the influence of shamal winds[2] (winds from the N and NW) in the northeast monsoon (winter) period and the minimal effect of the SW monsoon (summer months) at this site. Strong wind (20 – 30 mph, equivalent to 32 – 48 km/h) has only been recorded from January – June, and such wind blows from the NW or N, i.e. shamal wind. For the rest of the year, wind speeds are more moderate, with November and December experiencing wind of 5 – 10 mph (equivalent to 8 – 16 km/h) 50% of the time. Winds rarely exceed 30 mph (48 km/h).

[1] https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/qarn-alam_oman_286909
[2] Shamal winds (shamal means north in Arabic) are northerly winds that typically blow during the NE monsoon season (Nov – April) along the axis of the Arabian Gulf. They are typically events lasting 3-5 days of persistent wind). Northerly winds can also occur in other seasons, which are known as 'summer shamal winds'.

FIGURE 6.7 WIND SPEED BY MONTH AT QARN ALAM



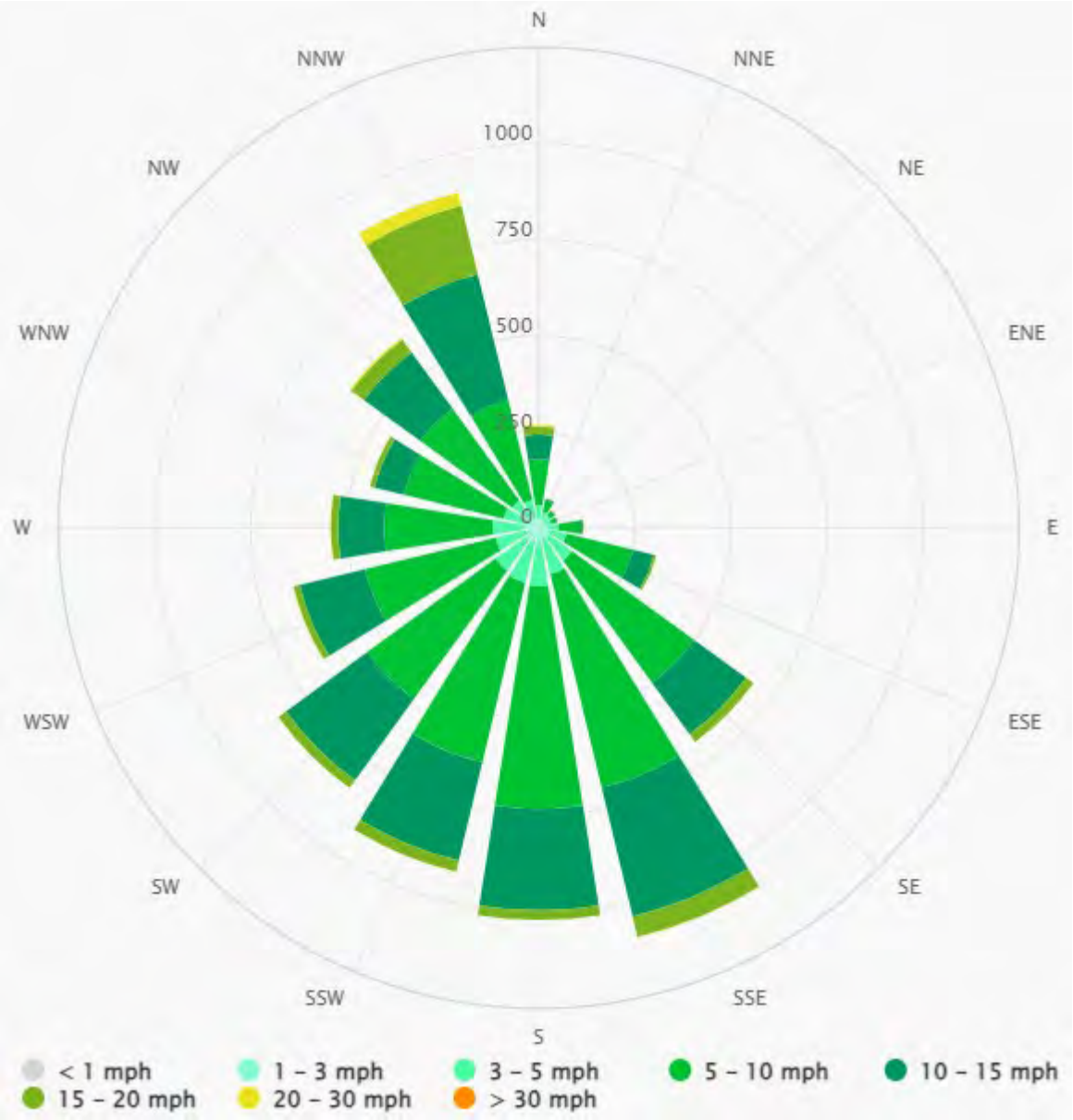
Source: https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/qarn-alam_oman_286909 (Accessed July 2024)

The annual distribution of wind direction at Qarn Alam is represented in the wind rose in Figure 6.8 which confirms that the strongest winds blow from the NE and N (one of the most regular wind directions observed on site), presumably during the winter months when shamal winds blow for periods of 3-5 days. Lighter winds generally blow from the southeast during the summer, these are associated with air streams linked to the SW monsoon which branches off the main jet stream and meander northward across the central deserts, bringing occasional convective rain which mostly falls on the south sides of Oman's Hajar Mountains, but can fall on the low-lying desert plains. It is noteworthy that very little wind at Qarn Alam blows from the NE or East.

In addition to large scale drivers and patterns of wind speed and direction, small scale events such as dust devils, vertical whirl winds, also affect the site. These are caused when bodies of air heated by the sun rise quicky causing wind shear that induces a vortex. Dust devils are most likely to form on calm days and are relatively low energy phenomena but are a mechanism for dust generation and transport.

Wind patterns at the site are an important parameter for the design of the facility, as well as developing an understanding of the potential for dust generation on windy days, particularly during the construction phase, but also during the operation phase as dust deposition on solar panels diminishes their efficiency and determines the frequency of cleaning.

FIGURE 6.8 WIND ROSE AT QARN ALAM

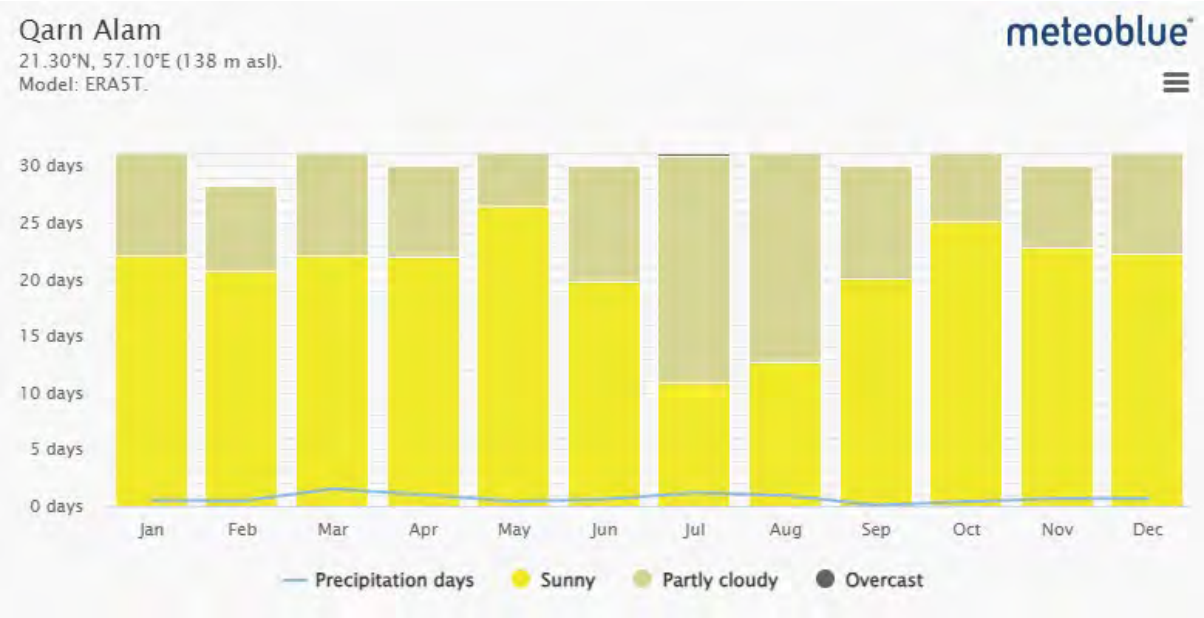


Source: https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/qarn-alam_oman_286909 (Accessed July 2024)

6.1.3.4 SOLAR RADIATION

Conditions at Qarn Alam are generally sunny (22 days per month on average), with majority of other days being partly cloudy (Figure 6.9) with minimal risk of overcast days. This confirms the solar resource at the site is high quality with long and reliable periods of solar radiation occurring throughout the year.

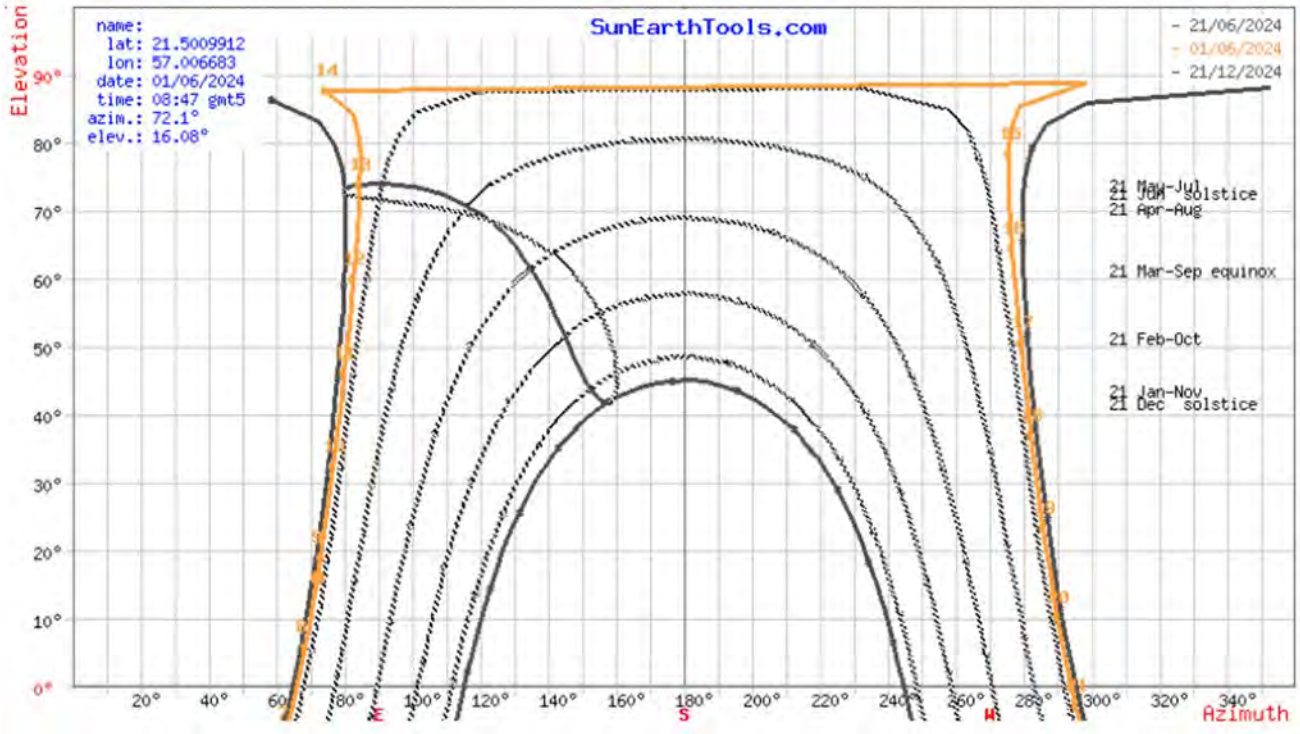
FIGURE 6.9 DISTRIBUTION OF SUNNY AND CLOUDY DAYS AT QARN ALAM



Source: https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/qarn-alam_oman_286909 (Accessed July 2024)

The path of the sun (including elevation angle and azimuth angle) throughout the year at the Project site is shown in Figure 6.10. The elevation angle measures the height of the sun in the sky from the horizon; it's the complement of (90 degrees minus) the zenith angle of the sun. North is defined to have an azimuth of 0° and south has an azimuth of 180°. The figure shows the sun's path at Qarn Alam as predicted by the University of Oregon's solar path model (www.sunearthtools.com). The lowest sun angles occur on the winter solstice (21 December), when at its azimuth the sun reaches a maximum of 45 º at around 14:00. Since the site is located just south of the Tropic of Capricorn, sun angles are favorable for solar power generation for much of the year and are directly overhead during the period around the summer solstice on 21 June. Given the coverage of panels across the site, the majority of the ground will be in shadow and protected from direct solar radiation, except for access paths.

FIGURE 6.10 SUN PATH CHART SHOWING THE ELEVATION ANGLE AND AZIMUTH ANGLE OVER A DAY AT THE PROJECT SITE



Source: University of Oregon, sunearthtools.com accessed July 2024.

6.1.3.5 CLIMATE CHANGE

The central aim of the Paris Agreement is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 °C (UN Climate Change, 2015).

A substantial reduction in greenhouse gas emissions is imperative to avoid irreversible damage caused by the impacts of climate change. “When it comes to rises in global average temperature, every fraction of a degree matters” was stated in a recent publication providing analysis for the Global Carbon Budget 2018 (Figueres et al., 2018).

The 2018 IPCC Special Report (IPCC, 2018) highlighted that to limit global warming to below 1.5 ºC by the end of the century, emissions would need to decline by approximately 45% by 2030 and reach net zero around 2050. This is the temperature rise when a variety of increasingly severe effects are considered to occur and the IPCC identifies that rapid and far-reaching transitions are required in all sectors including energy. Action is required immediately to reduce emissions by 45% by 2030. Figures from the Global Carbon Project however report that global CO_2 emissions from fossil fuels and industry have increased every decade from an average of 11.4 gigatonnes of equivalent carbon dioxide ($GtCO_2$) in the 1960s to an average of 34.7 $GtCO_2$ per year from 2009-2018. Emissions in 2018 reached a new record high of 36.6 $GtCO_2$. Though global emissions in 2019 have been projected to increase by an additional 6%, which is a slower growth than in the past two years.

Moreover, according to the 2023 IPCC Climate Change Synthesis Report, global warming will continue to increase in the near term (2021–2040) mainly due to increased cumulative CO_2 emissions in nearly all considered scenarios and modelled pathways. In the near term, global

warming is *more likely than not* to reach 1.5 °C even under the very low GHG emission scenario (SSP1-1.9) and *likely* or *very likely* to exceed 1.5 °C under higher emissions scenarios. In the considered scenarios and modelled pathways, the best estimates of the time when the level of global warming of 1.5 °C is reached lie in the near term. Global warming declines back to below 1.5 °C by the end of the 21st century in some scenarios and modelled pathways.

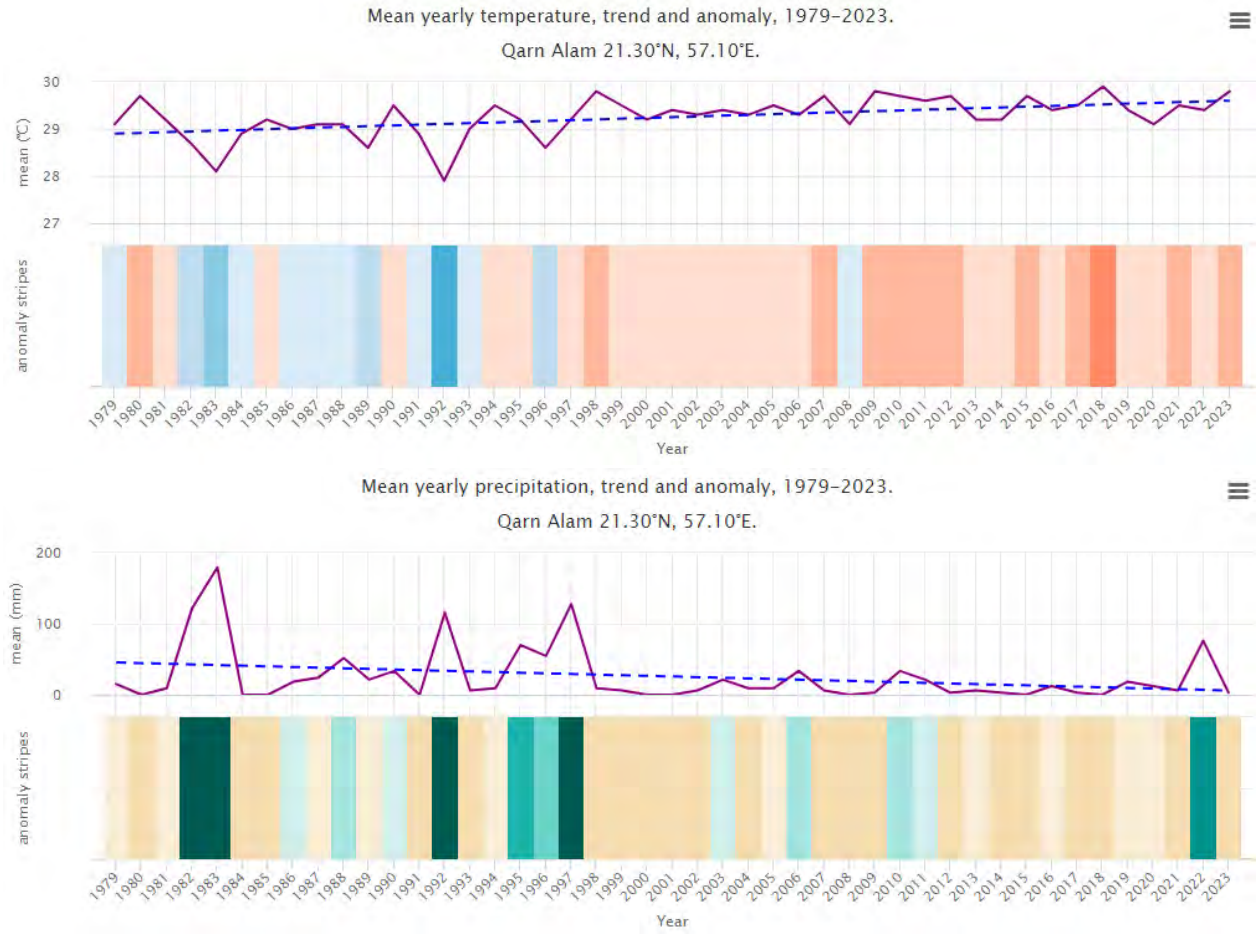
Oman presents significant vulnerability to climate change in relation to physical, economic and social factors. Oman's current climatic conditions range from semi to hyper aridity, with low rainfall, high evapotranspiration rates and water scarcity.

Oman is particularly vulnerable to climate change as most of its ecosystems are sensitive and its economy remains highly dependent on fossil fuel exports. The key climate change risks to Oman include sea level rise and temperature and precipitation variability/ extremes affecting urban infrastructure, population health and water resources (WBG, 2021).

The climate change hazards considered relevant to the Project and surroundings (both acute and chronic) include extreme hot temperatures and flooding (extreme rainfall), extreme winds (tropical cyclones) and sandstorms.

Temperatures in Oman are starting to show evidence of being affected by climate change. The average mean temperature of Oman between 1979 and 2023 is presented in Figure 6.11. Between 1979 and 2023, the annual mean temperature has increased from 28.9 ºC to 29.6 ºC, and the highest annual mean temperature recorded was in 2019 (29.9 ºC), which is indicated as an anomalous year (dark orange). Anomalously high temperatures have been increasing since around 1997 (warm colours), compares to the previous 20 years (predominantly cool colours).

Figure 6.11 LONG TERM TEMPERATURE AND PRECIPITATION PATTERNS AT QARN ALAM



Data series from 1979 – 2023. Qarn Alam coordinates: N 21.3° E 57.10°
Source: Meteoblue, 2024.

With the rising mean temperature, heatwaves are becoming more intense in Oman. Climate projections indicate that Oman will experience higher temperatures in the coming decades, with more frequent heatwaves. Climate models predict that under a high-emissions scenario[3] the mean annual temperature is projected to rise by ~5 °C on average from 1990 to 2100, and the number of days experiencing a heatwave is projected to increase from <15 in 1990 to ~280 days on average in 2100. Under a low-emissions scenario[4], the mean temperature rise may be limited to ~1.5 °C and the number of days of heatwave to ~85 on average in 2100 (International Energy Agency (IEA), 2023).

Similarly, the long term trend in precipitation patterns is given in Figure 6.11, which shows a long term trend in average rain fall from 1979 to 2023, from around 50 mm to less than 5 mm. Oman experiences natural cycles of drought and wetter years, so care is required when interpreting long term data, and a drought has been experienced at Qarn Alal from 1998 to 2023. Precipitation is predicted to increase slightly in the winter throughout the region and in the summer to remain the same in the north-east and increase in the south-west (i.e. the southern portion of the Arabian Peninsula).

[3] Intergovernmental Panel on Climate Change (IPCC) Shared Socioeconomic Pathway (SSP): 5-8.5,
[4] IPPC SSP1-2.6

Projections for wind speeds in Oman over the next century show that in the near term (i.e., by 2050), there is unlikely to be significant changes to wind speeds. By the end of the century, under a RCP5-8.5C scenario, there will be a slight increase in the regionally maximum mean annual wind speed and a slight decrease in the wind speed variability (Kamranzad et al., 2019).

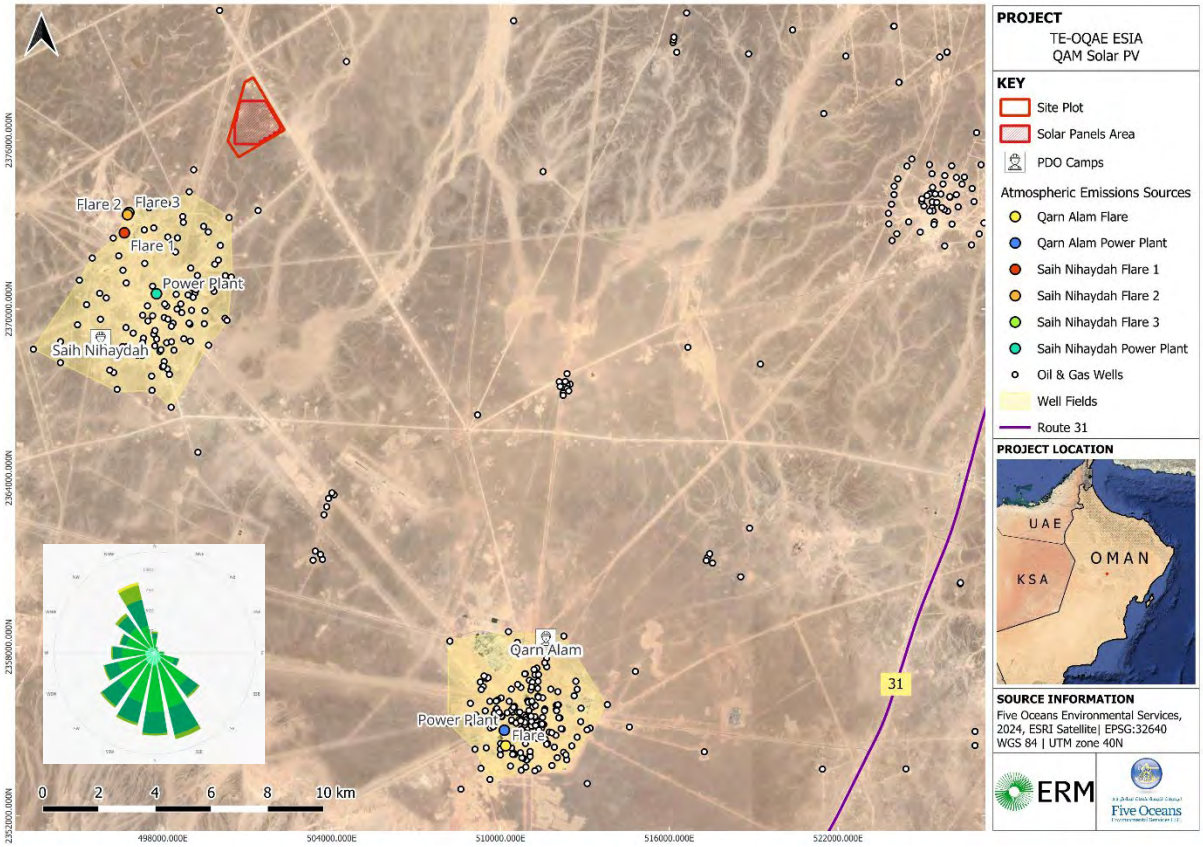
Oman has become a member of the National Strategy for Adaptation and Mitigation to Climate Change 2020-2040 to outline the nation's long-term vision on climate change. The purpose of the country's involvement in the strategy is to inform future policy dialogues by laying out clear strategic actions on adaptation and mitigation to ensure low emissions and climate resilience growth is promoted.

A screening assessment of the physical climate change hazards at the Project location and surroundings is provided in Appendix D –CCRA.

6.1.4 AIR QUALITY

The Project site is located in a remote desert environment, with the surrounding wider area dominated by oil and gas exploration and production activities (Figure 6.12).

FIGURE 6.12 OIL AND GAS FACILICTIES AROUND THE PROJECT AREA AND QARN ALAM WIND ROSE

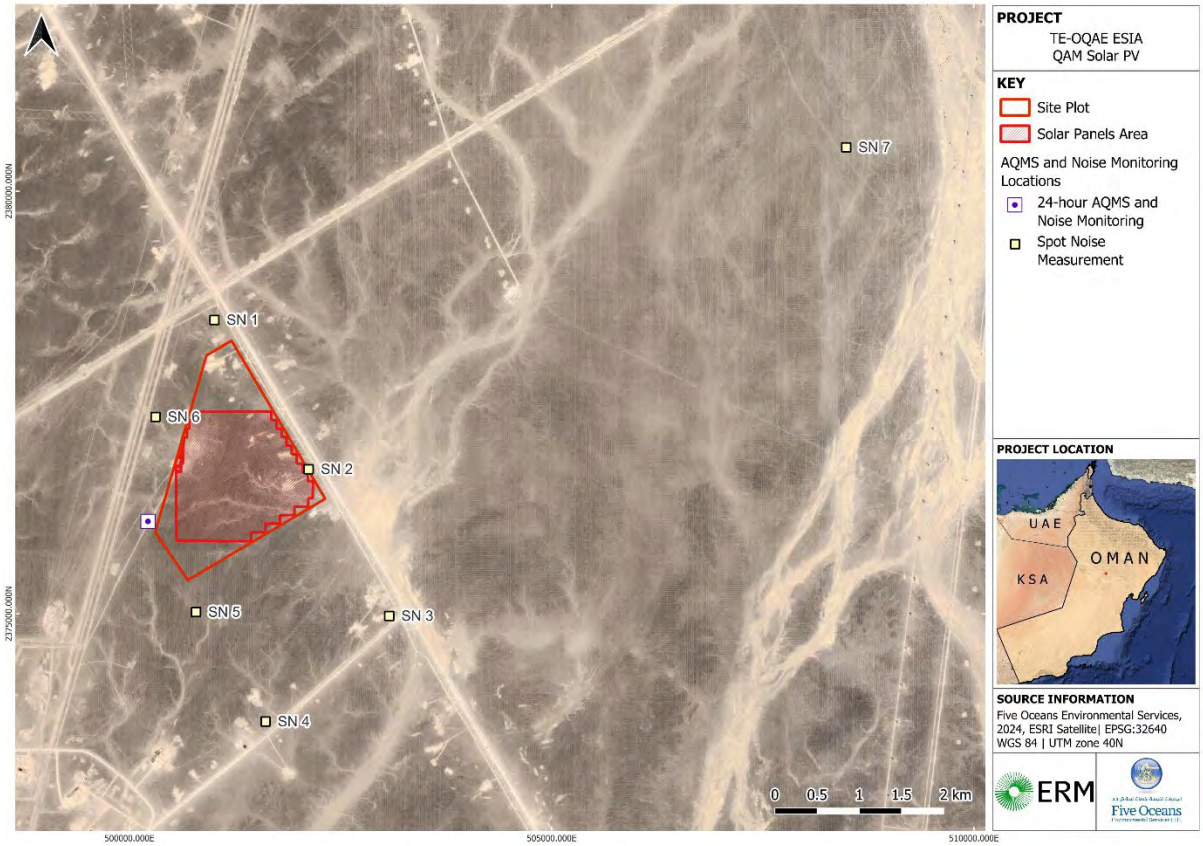


Source: 5OES, 2024.

Monitoring of ambient air parameters was conducted over 24 hr period from 11 – 12 May 2024, using an Earth sense Zephyr Ambient Air Quality Monitoring Station (AAQMS) at one location on the west of the project boundary (Figure 6.13 for its location, WGS84 coordinates Lat 21.487408 Long 57.002111). Concentrations of NO_2, SO_2, H_2S, PM_{10}, $PM_{2.5}$, CO, O_3 and

TVOCs were measured throughout the monitoring period and compared with international and national standards (MD 41/2017). In addition, the ambient weather conditions (temperature, relative humidity, atmospheric pressure) were also monitored using a weather station integrated with Zephyr AAQMS to support the interpretation of results.

FIGURE 6.13 AMBIENT AIR QUALITY AND NOISE SURVEY LOCATIONS



Source: 5OES, 2024.

Results show that the average ambient temperature and relative humidity (RH) was 32.7 °C and 20.7 % respectively (Table 6-2). On the other hand, wind direction (WD) was predominantly from the north and northwest, and wind speed (WD) averaged 7.4 m/s.

TABLE 6-2 HOURLY AVERAGES OF METEOROLOGICAL PARAMETERS AT AQMS DEPLOYED ON SITE

Station		Temperature	Relative Humidity	Atmospheric Pressure	Wind Speed	Wind Direction
		°C	%	kPa	m/s	(deg)
North Oman Solar Farm AQMS	Minimum	26.2	15.5	101.3	0.00	67.00
	Maximum	39.3	25.9	101.3	12.80	360.00
	Average	32.7	20.7	101.3	7.39	253.84

Source: 5OES, 2024.

The results from the AAQMS during the baseline survey are detailed below. Pollutant concentrations (PM_{10}, $PM_{2.5}$, CO, TVOCs, NO_2, SO_2 and O_3) over the air quality monitoring

period are given in Table 6-3 - Table 6-5 below together with international and national standards for 24 hr, 8 hr and 1 hr averaging periods, as applicable. The monitoring results are within the averaging limits in international and national (MD41/17) standards for all parameters. Minor short-term exceedence for some parameters (O_3, TVOC and H_2S) were observed in the data, but these did not result in any non-compliance with the applicable averaging periods for each parameter regulated in the standards. It should be noted that the dispersion of air pollutants strongly depends on local wind conditions, in particular the gentle but persistent north-westerly wind known as the summer Shamal, and diurnal breeze pattern caused by heating and cooling during the day – night cycle; therefore, potential influence of ongoing oil and gas activities cannot be discarded.

TABLE 6-3 RESULTS OF 24-HOUR AVERAGES OF AIR QUALITY PARAMETERS (NO_2, SO_2, PM_{10} & $PM_{2.5}$) (11 – 12 MAY 2024)

Parameter (Units)	**NO_2 ($\mu g/m^3$)**	**SO_2 ($\mu g/m^3$)**	**PM_{10} ($\mu g/m^3$)**	**$PM_{2.5}$ ($\mu g/m^3$)**
IFC Standards (24 hr)	200	125 (Target 1) 50 (Target 2) 20 (Guideline)	150 (Target 1) 100 (Target 2) 75 (Target 3) 50 (Guideline)	75 (Target 1) 50 (Target 2) 37.5 (Target 3) 25 (Guideline)
MD41/17 (24 hr) Limits	130	150	150	65
Minimum	0.0	34.74	10.0	8.9
Maximum	18.5	48.57	10.5	9.0
Average	9.2	41.65	10.3	9.0

Source: 5OES, 2024

TABLE 6-4 RESULTS OF 8-HOUR AVERAGES OF CO, O_3 AND TVOC DURING AIR QUALITY MONITORING (11 – 12 MAY 2024)

Parameter (Units)	**CO (µg/m³)**	**O_3 (µg/m³)**	**TVOC (µg/m³)**
IFC Standards (8 hr)	-	160 (Target 1) 100 (guideline)	-
MD41/17 Limit	10,000	120	0.24
Minimum	0.00	0.00	0.0000
Maximum	0.00	191.21	0.1002
Average	0.00	99.01	0.0211

Source: 5OES, 2024

TABLE 6-5 RESULTS OF ONE-HOUR AVERAGES OF H_2S, NO_2, SO_2 & CO DURING AIR QUALITY MONITORING (11 – 12 MAY 2024)

Parameter (Units)	**H_2S (µg/m³)**	**NO_2 (µg/m³)**	**SO_2 (µg/m³)**	**CO (µg/m³)**
IFC Standards (1 hr)	-	-	-	-
MD41/17 Limit	30	250	350	30,000
Minimum	0.00	0.00	0.00	0.00
Maximum	71.23	49.72	60.51	0.00
Average	10.31	2.22	25.16	0.00

Source: 5OES, 2024

As well as providing baseline air quality data for the site as a matter of best practice in impact assessment, the baseline serves to address any concern that ambient air quality at the site may have been degraded by surrounding oil and gas production activities in the AOI. The results show that average air quality is within international and national standards. Maximum instantaneous H_2S concentrations detected by the monitoring equipment have been investigated and it has been concluded that these results are best explained as being caused by instrument error (EarthSense, pers com., 2024).

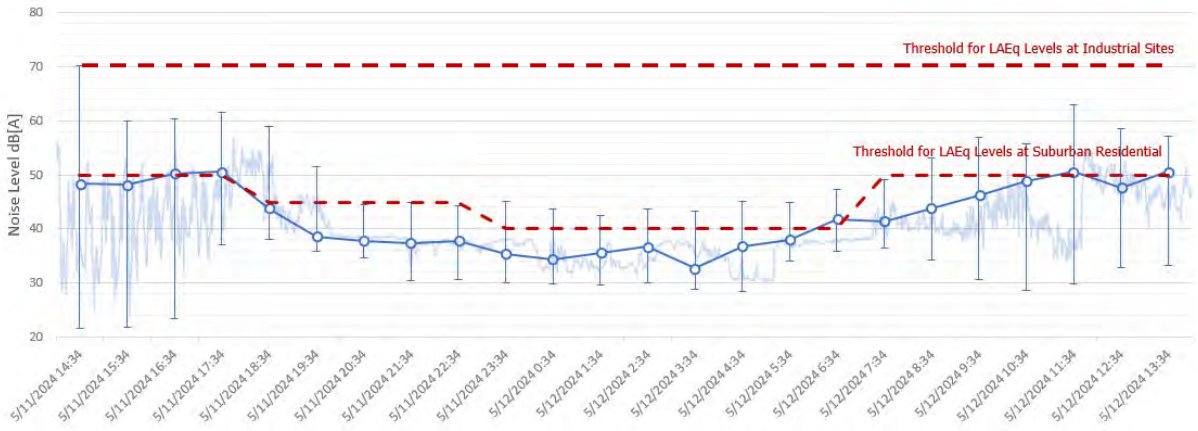
6.1.5 NOISE AND VIBRATION

Measurements were taken over 24 hrs at one location on the western site boundary closest to potential noise sources originating from Saih Nihaydah (Figure 6.13; coordinates: Lat 21.487408, Long 57.002111), and spot measurements of 15 minutes taken at a further seven locations around the site. Monitoring was conducted using a Bruel & Kjaer 2250 Class 1 integrating sound level meter (SLM) for LA_{eq}, LA_{min} and LA_{max} values in accordance with international standards and national legislative requirements given in MD 79/94.

Figure 6.14 illustrates the hourly recorded noise levels at the location where 24 hr noise monitoring was conducted in May 2024. The graph shows one minute averages as a time

series (light blue), with hourly averages with one standard deviation given in dark blue. Since surveys have been conducted at the development site, and the dominant land use in the surrounding area is industrial with absence of settlements, these results have been compared to the IFC standards (2007) for commercial and industrial sites and national standards for industrial plants (MD 79/1994), both of which set 70 dB(A) as the accepted limit. For reference, national standards (MD 79/1994) for residential areas have also been included in the graph: daytime (07:00 – 18:00) 50 dB(A), evening (18:00 – 23:00) 45 dB(A), and night (23:00 – 07:00) 40 dB(A), while IFC Standards for residential, institutional and educational facilities are: daytime (07:00 – 22:00) 55 dB(A) and nighttime (22:00 – 07:00) 45 dB(A). Hourly data is given in Table 6-6.

FIGURE 6.14 HOURLY LA_{EQ} NOISE MONITORING GRAPHS AT QARN ALAM SOLAR FARM, 11 – 12 MAY 2024



Source: 5OES, 2024

TABLE 6-6 HOURLY NOISE MONITORING RESULTS AT 24 HR NOISE MONITORING STATION ESTABLISHED ON THE PROJECT SITE

Date & Time	Period	Limit*	LA_{eq}	LA_{max}	LA_{min}	LA_{90}	LA_{10}
		[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
11/05/24 14:34	Day	70	48.5	70.1	21.6	51.1	29.0
11/05/24 15:34	Day	70	48.3	60.0	21.8	53.4	32.3
11/05/24 16:34	Day	70	50.3	60.4	23.4	52.4	36.5
11/05/24 17:34	Day	70	50.6	61.6	37.1	55.6	41.6
11/05/24 18:34	Evening	70	43.8	59.0	38.1	50.4	38.8
11/05/24 19:34	Evening	70	38.7	51.5	35.8	45.1	38.4
11/05/24 20:34	Evening	70	37.8	44.6	34.6	38.5	38.2
11/05/24 21:34	Evening	70	37.5	45.0	30.4	38.2	35.0
11/05/24 22:34	Evening	70	37.7	44.4	30.6	38.0	35.6
11/05/24 23:34	Night	70	35.4	45.2	30.0	38.0	32.5

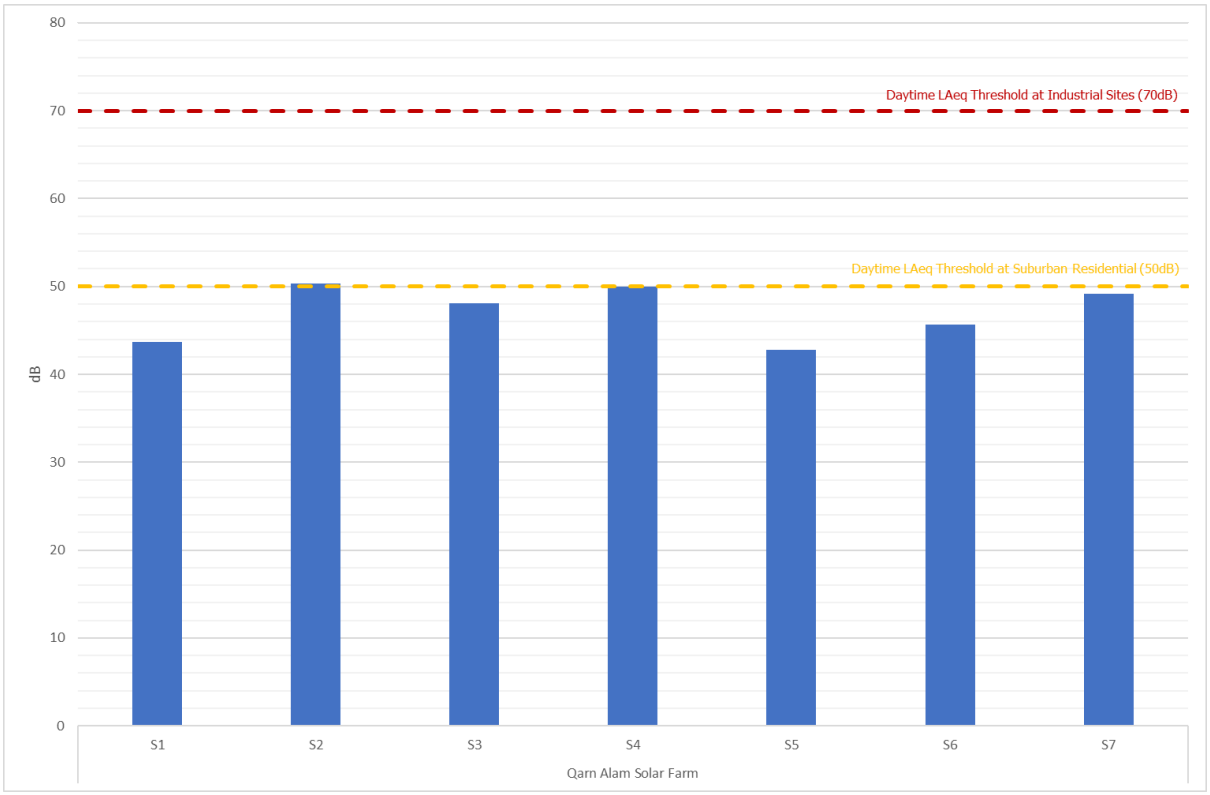
Date & Time	Period	Limit*	LA_{eq}	LA_{max}	LA_{min}	LA_{90}	LA_{10}
		[dB]	[dB]	[dB]	[dB]	[dB]	[dB]
12/05/24 00:34	Night	70	34.3	43.7	29.8	37.0	31.4
12/05/24 01:34	Night	70	35.6	42.6	29.7	36.7	31.8
12/05/24 02:34	Night	70	36.7	43.8	30.1	37.7	33.6
12/05/24 03:34	Night	70	32.8	43.3	28.9	37.4	30.7
12/05/24 04:34	Night	70	36.8	45.1	28.5	37.6	29.7
12/05/24 05:34	Night	70	37.9	44.9	34.1	37.6	36.6
12/05/24 06:34	Night	70	41.8	47.4	35.9	41.9	37.6
12/05/24 07:34	Day	70	41.3	49.2	36.5	45.5	38.2
12/05/24 08:34	Day	70	43.9	53.2	34.3	44.9	38.4
12/05/24 09:34	Day	70	46.1	57.0	30.7	49.2	38.5
12/05/24 10:34	Day	70	48.8	55.7	28.6	47.5	33.9
12/05/24 11:34	Day	70	50.6	62.9	29.8	55.2	36.8
12/05/24 12:34	Day	70	47.7	58.6	32.9	52.1	41.5
12/05/24 13:34	Day	70	50.6	57.2	33.2	51.1	40.2

The limit for industrial and commercial sites is 70 dB(A) in both international (IFC, 2007) and national standards (MD 79/1994)

Source: 5OES, 2024

On the other hand, results of the spot noise measurements taken in the project vicinity to give an indication of compliance with legal standards in the area are shown in Table 6-7 and Figure 6.15. The applicable limit as prescribed in IFC guidelines (2007) and in national legislation (MD79/94) for industrial and commercial sites is 70 dB(A), with residential limits given in MD 79/1994 as a reference only.

FIGURE 6.15 SPOT NOISE LA_{EQ} MONITORING AT LOCATIONS IN THE PROJECT VICINITY



Source: 5OES, 2024

TABLE 6-7 SPOT NOISE MONITORING RESULTS

	Location ID	Start Date & Time	Elapsed Time	LA_{eq}	LAF_{max}	LAF_{min}	LAF_{90}	LAF_{10}
				[dB]	[dB]	[dB]	[dB]	[dB]
Qarn Alam Solar Farm	S1	11/05/24 14:18:02	00:15	43.72	66.17	22.61	29.06	46.11
	S2	11/05/24 13:54:45	00:15	50.30	71.74	29.69	37.16	54.35
	S3	11/05/24 15:29:52	00:15	48.09	68.05	26.42	29.78	52.19
	S4	11/05/24 15:53:37	00:15	50.00	68.45	27.78	35.05	54.30
	S5	11/05/24 16:18:54	00:15	42.76	63.25	24.10	31.01	45.15
	S6	11/05/24 16:43:45	00:15	45.70	69.42	29.97	32.95	49.39
	S7	11/05/24 14:53:03	00:15	49.18	65.83	22.37	26.26	52.86

Source: 5OES, 2024

As a conclusion, no neighboring noisy activities were recorded, and noise on site during the monitoring period was attributable to natural sources i.e. wind. National and international standards relating to noise relate applicable thresholds to land use, and for a solar farm the most appropriate land use category is industrial, for which the national and international threshold is 70db(A). The Oman Environment Authority requires that this threshold is applied

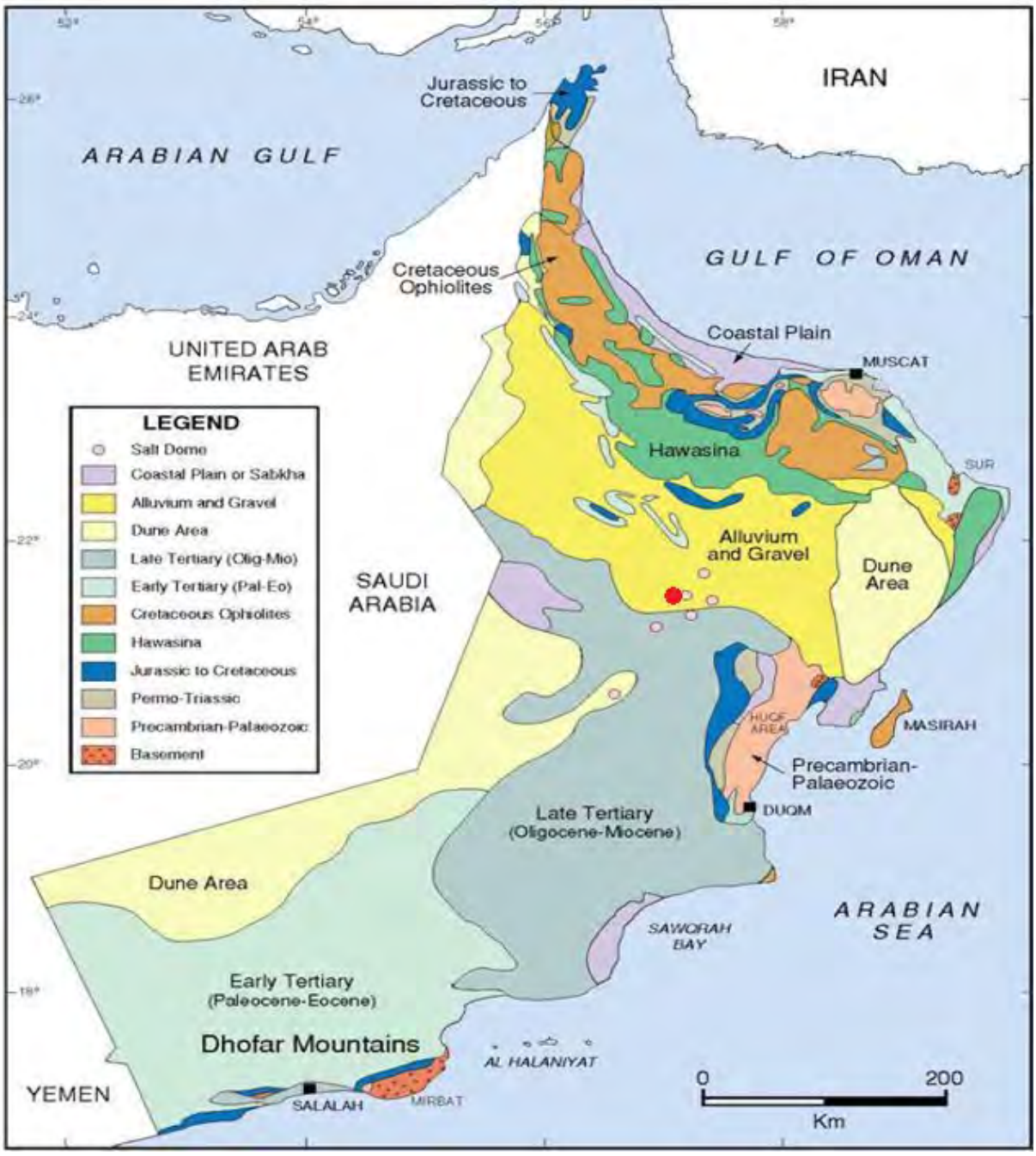
at the project's fence line. The project area is therefore considered to have a baseline that is within international and national limits for industrial land uses.

6.1.6 GEOLOGY AND SOIL

6.1.6.1 GEOLOGY

The geology of Oman has been mapped in detail by Bureau de Recherches Géologiques et Minières (BRGM) on behalf of the Ministry of Petroleum and Minerals (Figure 6.16), and cited in El-Hussein et al. (2014). The project location is indicated in the map below, and sits on the norther edge of the central desert plateau of alluvium and gravel. The bedrock consists of limestone and dolomite of the Fars Formation, which contain scientifically important micro-fossils from the Neoproterozoic to Cambrian Era (from 1 billion – 485 million years before present).

FIGURE 6.16 OVERVIEW OF THE GEOLOGY OF OMAN



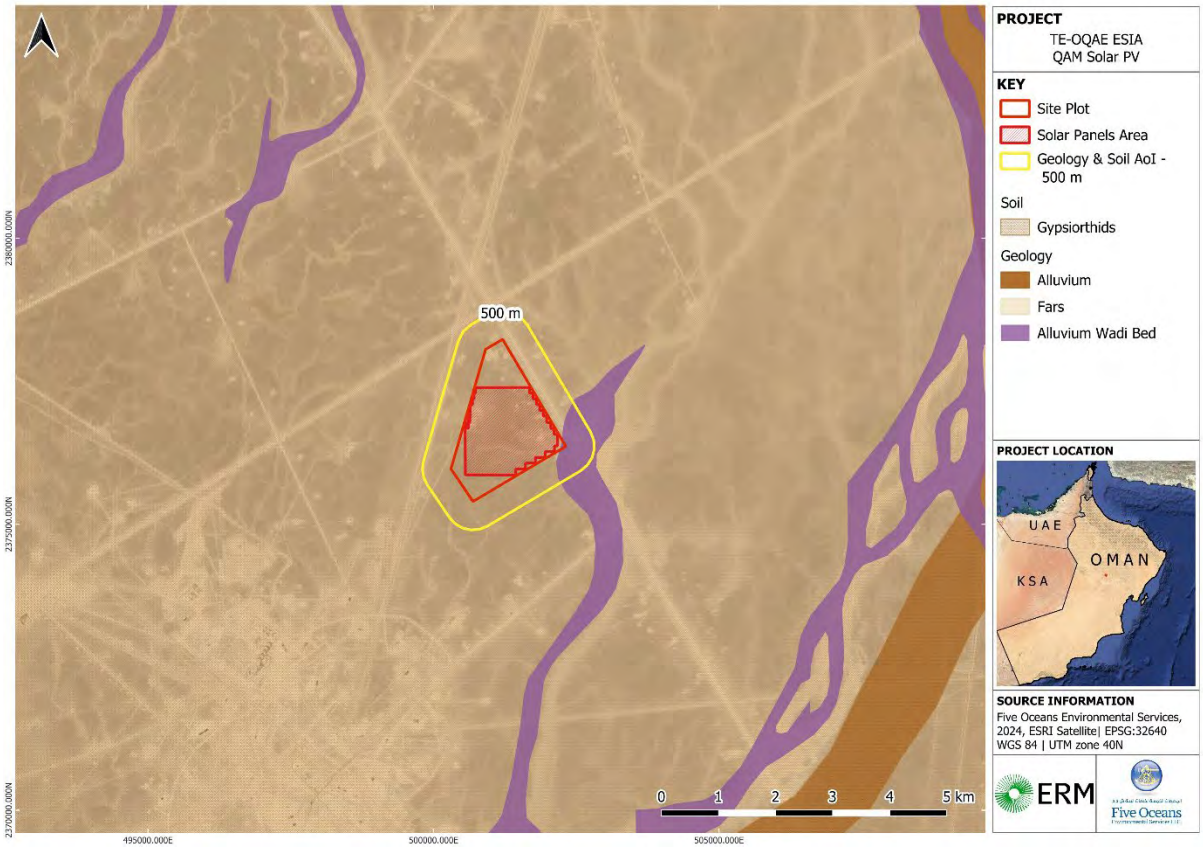
The red dot indicates the project location, 5 km from the salt dome at Kibrit.

Source: Bureau de Recherches Géologiques et Minières (BRGM), undated, cited in El-Hussein et al, 2014.

The major geological units exposed in the Project area are illustrated in Figure 6.17, based on the national scale geological mapping conducted by BRGM (Bureau de Recherches Géologiques et Minières) on behalf of the Ministry of Petroleum and Minerals. The map shows the location of the project (red dot) as located in the alluvium and gravel plains that occur in central Oman in the washout plain to the south of the Hajar Mountains, as well as the salt domes that occur in the area around the project, the closest of which is at Kibrit, 13 km to the east of the project boundary.

No protected geological features are found on the Project site.

FIGURE 6.17 SOIL AND GEOLOGY AROUND THE PROJECT SITE

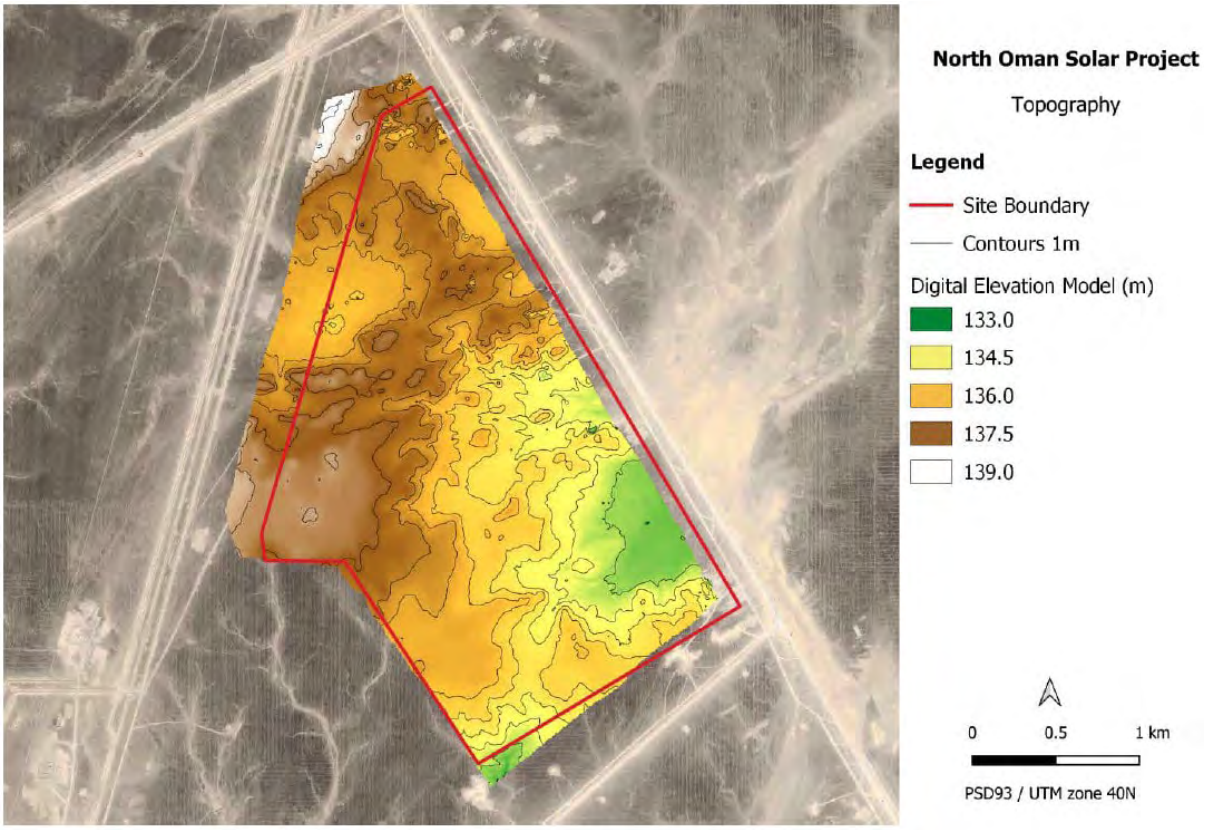


Source: ERM, 2024.

Topography of the Site

Topography on site was surveyed by ESBAAR in 2022 using drones. The site is generally flat with an elevation of 139 in the NW corner to the site to 136 in the SE corner (Figure 6.18), with minor variation caused by mounds of earth associated with borrow pits, and drainage lines particularly in the SE quadrant. Low mounds of earth are also aligned along the unpaved road running along the NE boundary caused by earth works during its construction and maintenance.

FIGURE 6.18 TOPOGRAPHY OF THE SITE



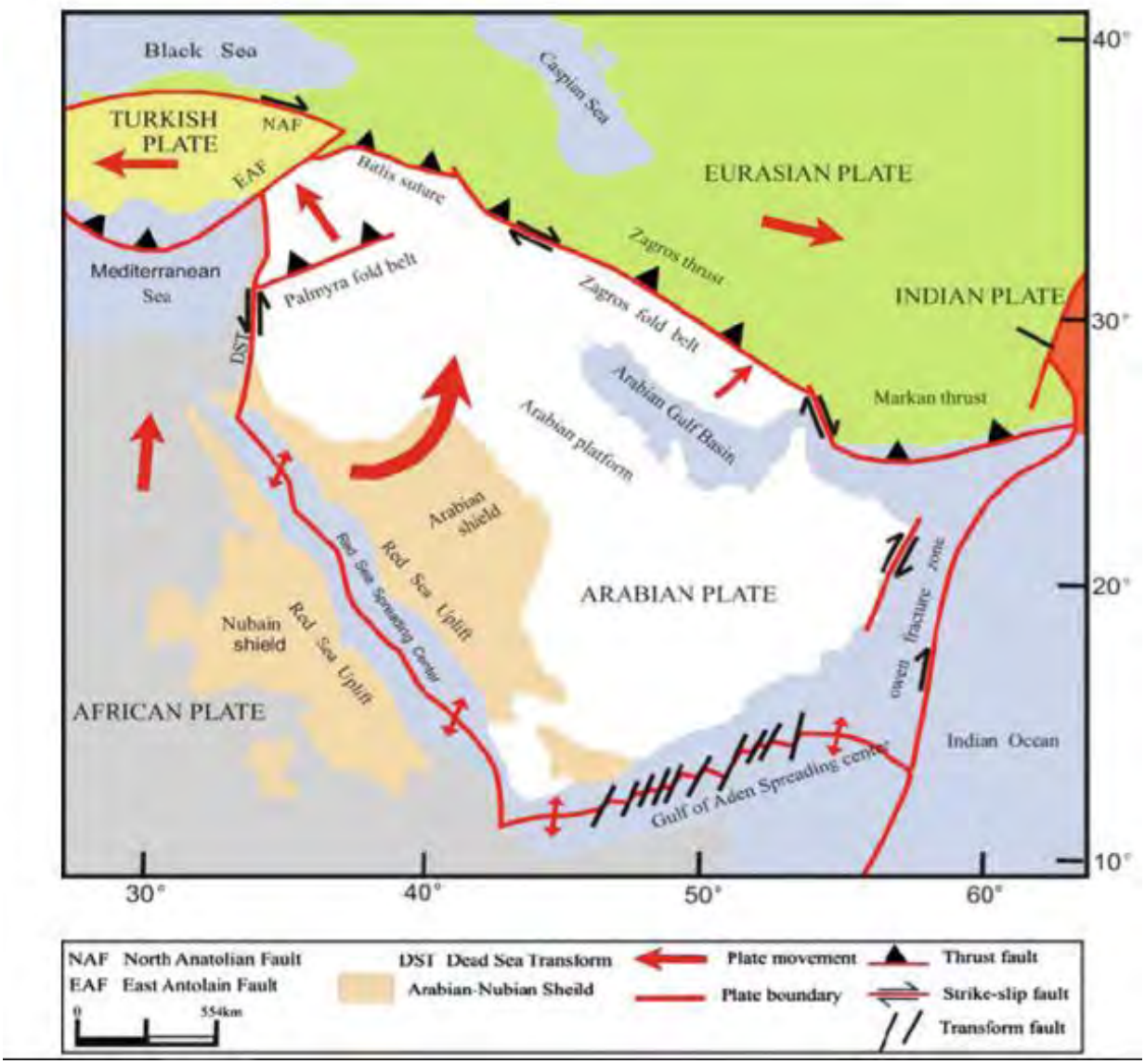
Source: Worley Consulting (2024), based on data from ESBAAR (2022)

6.1.6.2 GEOLOGICAL HAZARDS

Seismicity

Oman is located on the north-eastern margin of the Arabian plate which, through continental collision, has given rise to the folded Zagros Mountains as shown in Figure 6.19. The oceanic part of the Arabian plate is subducting along the Makran Trench which is marked by intense earthquake activity. As the Arabian plate moves north-eastwards, parts of the plates are differentially deformed and periodic release of such stress accumulations causes earthquakes at the edge of the plate. The 1971 Al-Kamil (around 250 km to the NE of the site) earthquake in Oman is a rare example of an intraplate earthquake that has been recorded in the global United States Geological Services (USGS) database. According to Earthquake Tracker (https://earthquaketrack.com/p/oman/recent), no recent earthquake have occured in the project area.

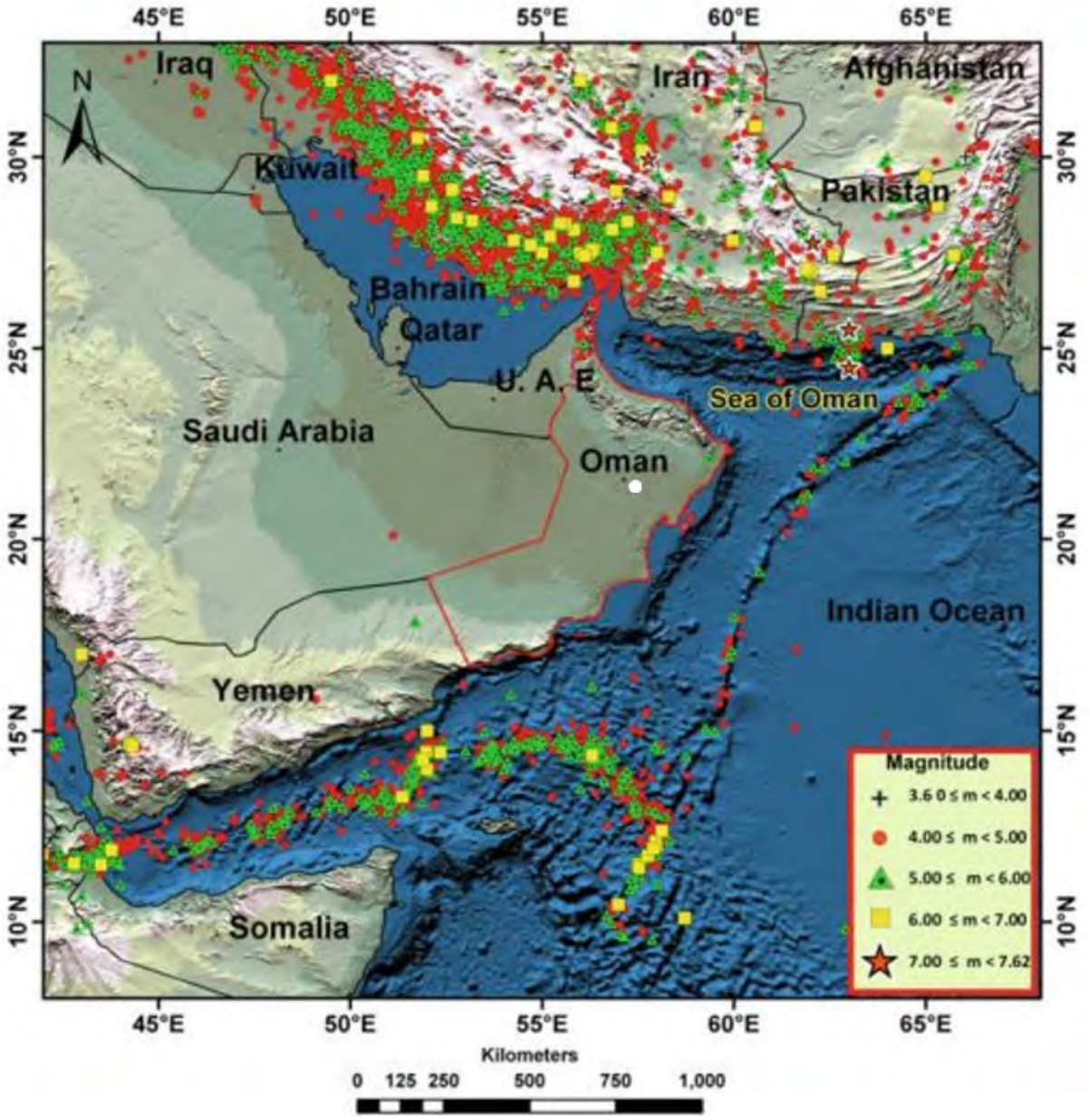
FIGURE 6.19 TECTONIC ELEMENTS SURROUNDING THE ARABIAN PLATE



Source: El-Hussain et al. 2012.

The USGS maintains a database of seismic events in Oman, including those recorded by the Earthquake Monitoring Centre at Sultan Qaboos University. Available data have been used to plot the location and magnitude of seismic events in the region, as shown Figure 6.20. This figure indicates that the magnitude of seismic events in Oman range between 4 to 5 on the Richter scale, which is consistent with the most felt earthquakes recorded in Oman. Seismic events are very infrequent (none from 1904 – 2008) in the Project area. The USGS earthquake database was searched for earthquakes occuring in Oman from 2008 - 2024 which confirmed this long term pattern, with only one recorded earthquake of magnitude 4.8 with its epicentre in Dhofar Governorate, approximately 390 km southwest of the North Solar Project, occuring in November 2023.

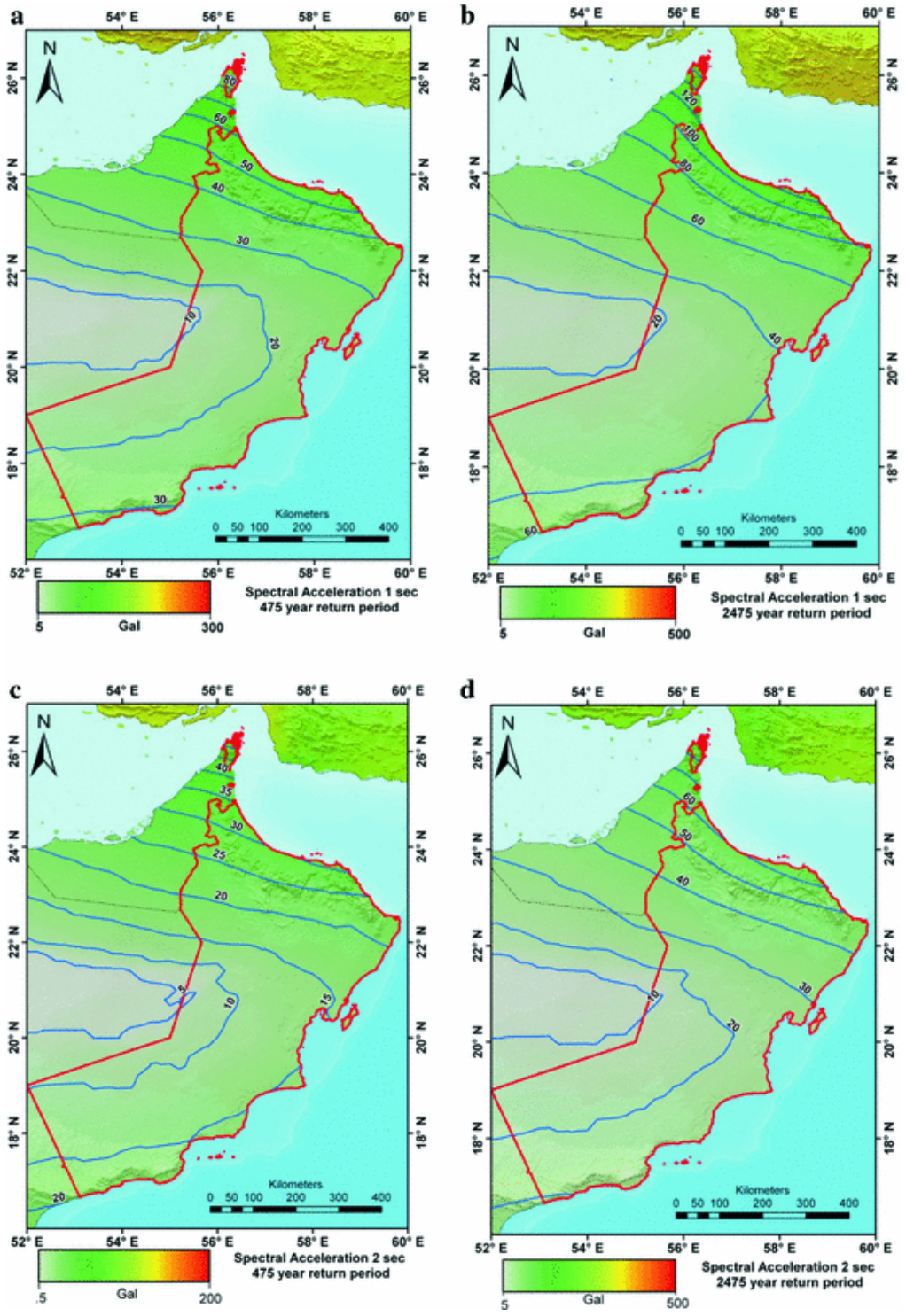
FIGURE 6.20 INSTRUMENTAL SEISMICITY OF OMAN FROM 1904 TO 2008



Project location indicated with white dot.
Source: El-Hussain et al. 2012.

The USGS also calculates peak ground acceleration for the Middle Eastern region as shown in Figure 6.21. Peak ground acceleration is a measure of ground motion as a result of seismic or other activities. The figure delineates the north-eastern region of relatively higher seismic hazard from the rest of the country which is characterized by lower hazard levels. Seismic events in the Project area having a return period of 475 years are dominated by intense but distant earthquakes (El-Hussain et al., 2012), see top and bottom left in Figure 6.21 below for details. This indicates that seismic activity experienced in the project area have low acceleration rates, of around 15 – 20 cm/s^2, rising to 20 – 30 cm/s^2 for events with a 2475 year return period. High ground motion levels at short distances are not likely to occur which suggest a low level of seismicity in the area of interest. In any case, Oman building codes addressing siesmic risks should be applied for the Project.

FIGURE 6.21 MEAN PEAK GROUND ACCELERATION (CM/S^2) IN THE SULTANATE OF OMAN

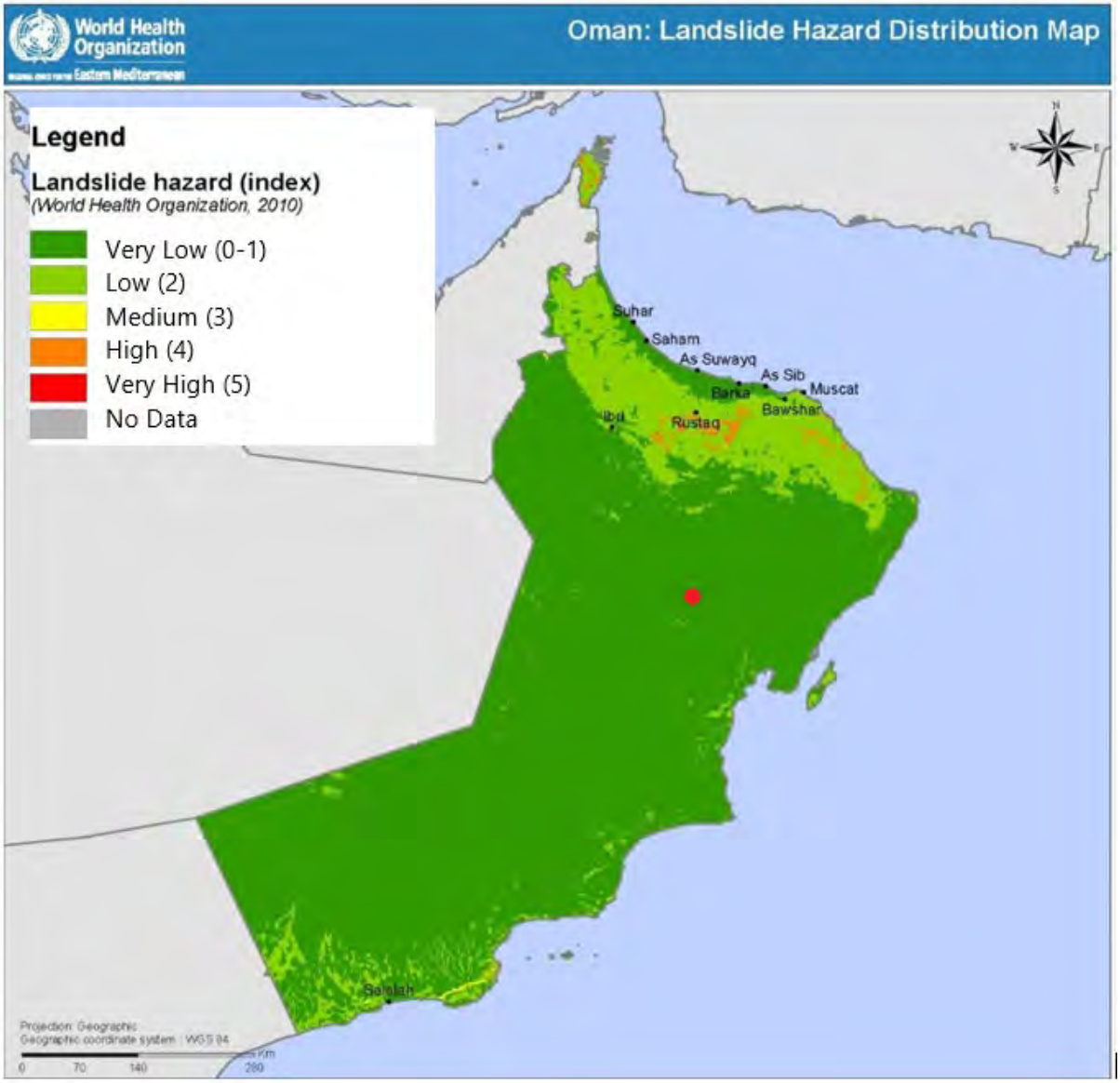


Source: El-Hussain et al, 2012.

Landslides

According to the World Health Organization (WHO, 2010), the susceptibility of the Project site to landslides is very low, as indicated in Figure 6.22 below.

FIGURE 6.22 LANDSLIDE HAZARD DISTRIBUTION IN OMAN



Red dot indicates the project site.

Source: WHO, 2010.

6.1.6.3 SOIL

General Description

The soils in Oman have been classified using the Soil Taxonomy system (1975), which consists of 61 mapping units. The national soil map has been used as the basis of in Figure 6.17, which indicates that the Project is located on calciorthid soils, specifically on a gypsiorthids group.

Calciorthid is the taxonomic classification of soils possessing the following properties:

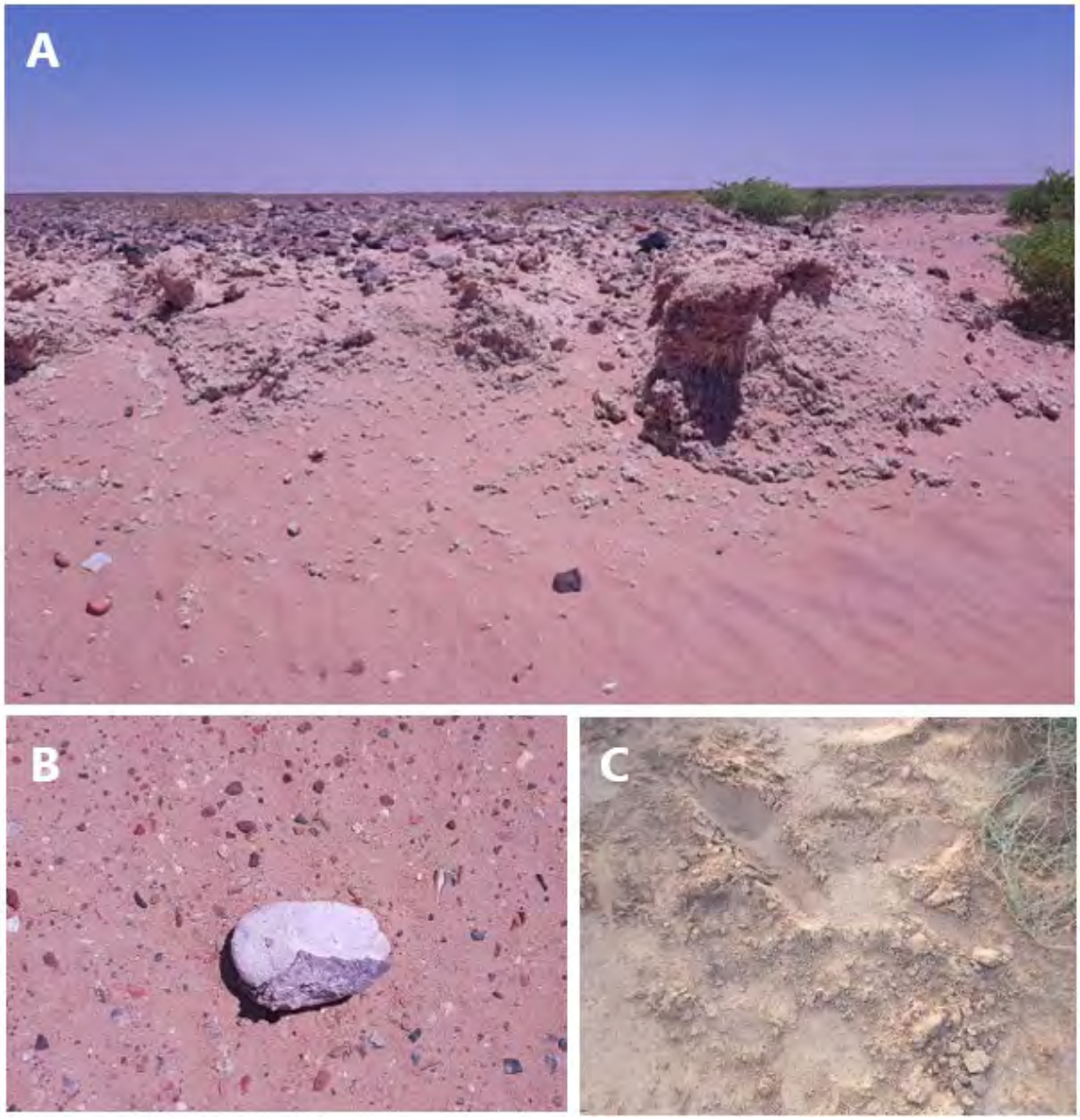
- Yellowish to grey colour, with overall grey colour reflecting a deficiency of organic matter,
- Poor in nitrogen, phosphorus and potash (potassium),
- Alkaline, with pH ranging from 7.8 to 8.5
- Sandy loam to silt in mixture

Within calciorthid, one taxa (great group) of soils is identified in the figure:

- **Gypsiorthids**, are gypsiferous soils that contain sufficient quantities of gypsum (calcium sulphate) to interfere with plant growth. Soils with gypsum of pedogenic origin are found in regions with ustic, xeric and aridic moisture regimes (Nettleton et al. 1982). They are well represented in dry areas where sources of calcium sulphate exist. In most cases gypsum is associated with other salts of calcium and salts of sodium and magnesium.

A geotechnical site investigation of the site, including soil analysis, was carried out in November 2022 by Oman Drilling & Soil Technology Co. LLC (ODST) and an ISO 17025:2017 accredited laboratory. Organic matter, gypsum as $CaSO_4$, pH and watersoluble sulphates and chlorides content of samples were analysed. Surface soil is described as silty sand with gravel down to around 20 – 30 cm below ground level, which becomes increasing more compacted and cemented from 0.3 m – 5 m to form weak to moderately strong siltstone or mudstone, with a significant gypsum content in many places. The 2022 geotechnical report recommends that foundations are installed at a minimum of 50 cm below lowest ground level and engineering fill is placed at least 50 cm beneath raft foundations. These findings are corroborated by walk over surveys on site conducted in May 2024 (see Figure 6.23)

FIGURE 6.23 SOIL CONDITIONS OBSERVED ON SITE



A: A section of soil and sub-soil taken from a shallow drainage channel on site, showing the loose gravel and sand surface layer and weakly cemented gypsiferous sub-soil. B: Cobble sized particle composed of limestone and precipitated gypsum, illustrating the gypsiferous nature of sub-soil.
C: Abandoned borrow pits on site act as sediment traps in which fine sediment transported during occasional rainfall has accumulated to form deeper soil that supports a more diverse plant community than the surrounding gravel plain.

Source: 5OES, 2024.

Surface soils are deflated, i.e. wind erosion has removed fine particles, leaving a layer of protective gravel at the surface. Deflated soils are easily disturbed and require many years of exposure to return to a natural equilibrium with the prevailing wind conditions, and until equilibrium is re-established disturbed soil will continue to generate more dust than surrounding undisturbed soil during wind conditions.

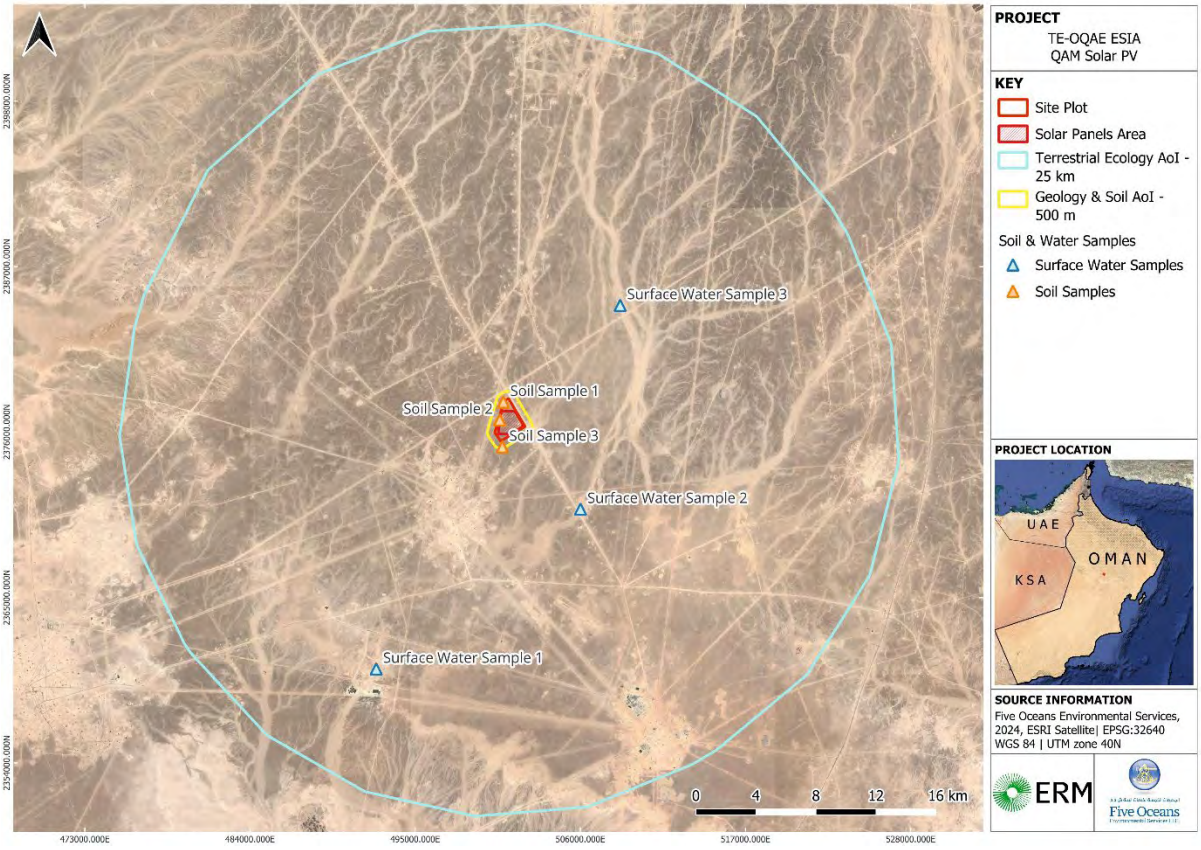
Porosity of surface soils is discussed on Worley Consultants (2024), based on findings of the geotechnical site investigation and observations made on site. Surface soils on site are

considered to have low porosity/permeability and therefore have relatively high run-off coefficient.

Soil Quality

Soil quality was also investigated using chemical analysis of three surface (< 10 cm) soil samples collected from the site in May 2024 (see Figure 6.24) and tested for over 90 contaminants including aliphatic and aromatic hydrocarbons, polyaromatic hydrocarbons (PAH), halogenated hydrocarbons, pesticides and cyanide. The purpose of the sampling was to confirm that the soil at the project site is uncontaminated by the surrounding oil exploration and production activities, particularly any drop out associated with test well flaring that may have occurred during the development phase of the surrounding oil fields.

FIGURE 6.24 SOIL AND SURFACE WATER SAMPLING LOCATIONS (MAY 2024)



Source: 5OES,2024

All samples contained undetectable (i.e., less than 0.05 g/kg) concentrations of all 90 contaminant species (laboratory analysis results are provided in Appendix G). Trace elements were also analysed through a whole sample digestion followed by atomic emission spectrometry (as per USEPA SW846/6010 C). Of the eleven elements that were tested, four were below the minimum detection limits (As, Cd, Hg, Mo, having detection limits of 0.3, 0.2, 0.1 and 0.1 mg/kg respectively).

Concentrations of Ni were in the range 86 – 101 mg/kg, and Chromium 49 – 55 mg/kg. Correlation between Ni and Cr concentrations indicate the presence in small quantities of erosion products from ultramafic rocks, such as peridotite and dunite. The source of such sediments is likely the Samail ophiolite massif, the southernmost surface exposure being

located approximately 150 km to the north of Samail. Given the hydrology of the site, with generally southward flows, and the age of the alluvium fans in the area, 250,000 and 200,000 yrs BP (Blechschmidt et al., 2009), these ophiolite containing sediments were fluvially transported to the site during a wet period in Oman's geological past.

The relatively high abundance of barium (Ba, 69 – 95 mg/kg) is probably associated with barite deposits found in sedimentary basins in central Oman. Other minor components (e.g., Co in the 7 – 8 mg/kg range, Cu in the 9 – 12 mg/kg range; Pb in the 3 – 8 mg/kg range,) and zinc in the 18 – 21 mg/kg range, all indicate the site has in the past received erosion products from volcanogenic massive sulfide (VMS) deposits containing low quantities of copper and zinc sulfides.

The results of geotechnical site survey do not indicate any significant engineering concerns or issues relating to ground conditions, and the results and observations on site during environmental surveys conducted for this study do not indicate any soil contamination from prior land use on site or land uses in the surrounding area. Elemental analysis shows sediments on site contain a low concentration of trace elements associated with the geology of source rocks, but these are incorporated into the crystal lattice of minerals, so are stable and not biologically available. Sediments are therefore considered inert and do not pose an environmental risk.

6.1.7 GROUNDWATER

Groundwater is the main water resource in Oman used for agricultural purposes (IWMI, 2016), whereas water supplies for domestic and industrial consumption are generally derived from desalination of seawater or brackish groundwater. Fresh groundwater is mostly present under the Al Batinah and Dhofar coastal plains, since these aquifers are sufficient recharged by rain, assisted in places by groundwater recharge dams.

In the central deserts of Oman, the aquifer systems are the Fars Complex and the UeR systems, a transboundary groundwater resource (UN-ESCWA, 2013). The Project lies on the NE boundary of the UeR aquifer system (also known as the UeR-Dammam/Nejd aquifer), which consists of four major formations:

- Dammam and Rus Formation: mostly unconfined aquifer made up of marl and gypsum with saturated thickness between 20 and 40 m, with conductivity ranging from 800 to 2500 µS/cm.
- Upper UeR: confined aquifer with thickness ranging from 100 to 200 m.
- Middle UeR: high-yielding aquifer with saturated thickness ranging from 100 to 150m and salinity typically 500 to 2,000 µS/cm.
- Lower UeR: poorly explored and likely non-productive aquifer with saturated thickness ranging from 100 to 200 m.

The UeR is an important, hydraulically linked regional aquifer that extends throughout the Arabian Peninsula. The southern part of overall Dammam-UeR aquifer South shown in beige in the centre of Figure 6.25, extends from south of the Hajar Mountains to Hadraumaut in Yemen and north into UAE and Saudi Arabia as far as Jubail, and provides groundwater in parts of Saudi Arabia and Al-Ain, UAE. In Oman, the aquifer is the main water supply source for much of the interior desert areas.

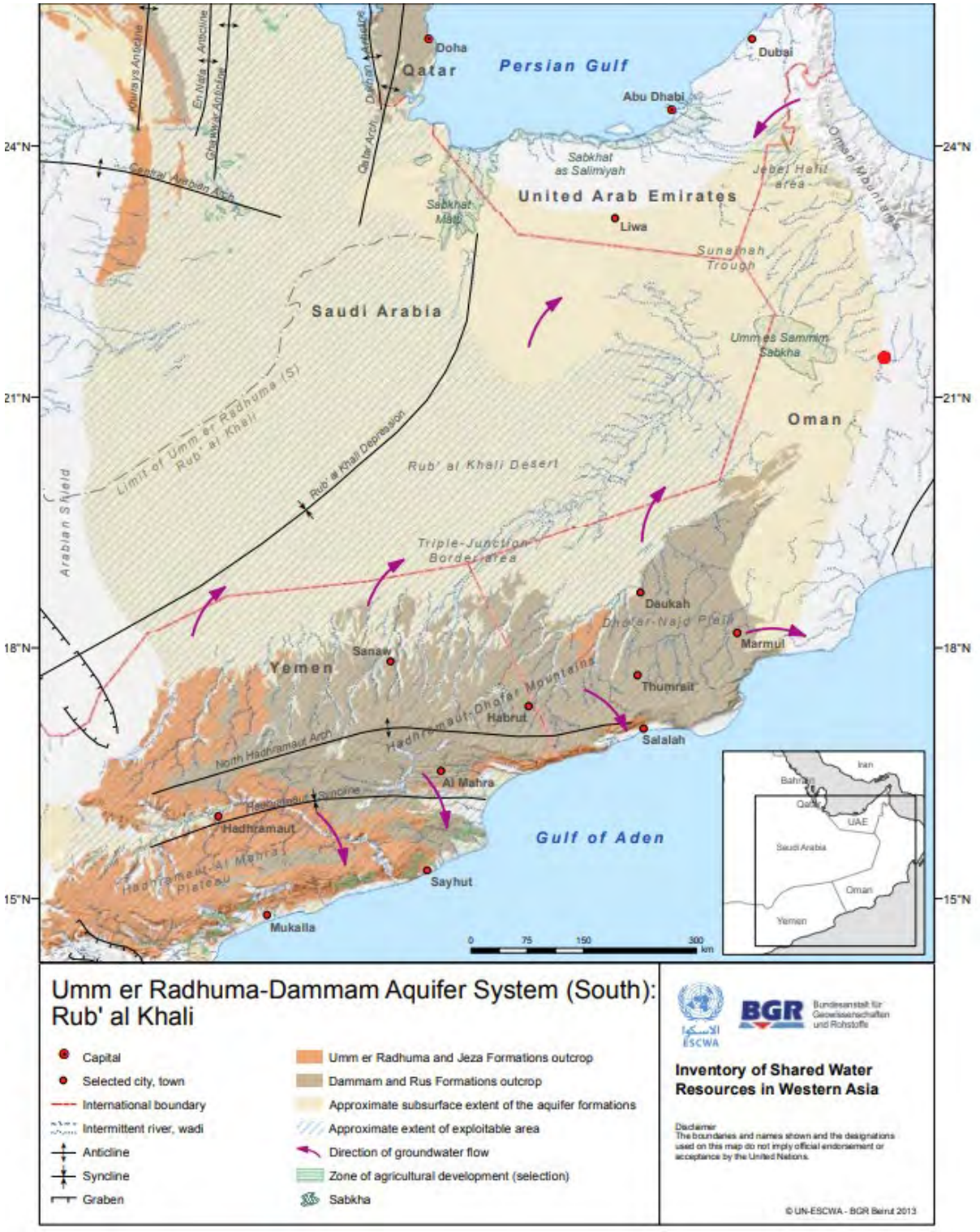
The chemistry of the UeR indicates that it is of the sodium-chloride type, with CO_3^{2-} and HCO_3^- present in low concentrations. The water exhibits a high sulphate content, which almost certainly originates from the formation's evaporites. The Rus and Dammam aquifers are interconnected and therefore are often referred to together. Both of these characteristics (low bicarbonate and high sulphate concentrations) are observed in water leaking from the pipeline crossing the project site, indicating that the source of that water is groundwater from the Rus formation.

Direct withdrawl from the Rus-Dammam aquifer for agricultural use around the solar farm site is limited. Freshwater required by the PDO operations at Qarn Alam and Saih Nihaydah is produced by desalinating brackish groundwater drawn from the Fars-Dammam aquifer from a depth below ground level of around 100 m. At a site 17 km southwest of the project site, for example, three reverse osmosis plants desalinates groundwater, and reject brine flows into lined evaporation ponds for disposal, one of which has an overflow into the environment (from where a surface water sample (QAWS1) was obtained.

Groundwater was encountered during the geotechnical investigation of site at depths below ground level of 11.8 – 13 m (Worley Consulting, 2024).

The project will not withdraw any groundwater directly but its modest demands, particularly during the construction phase, will ultimately be supplied from groundwater desalinated by third parties.

FIGURE 6.25 UER AQUIFER SYSTEM



Project site is located with a red dot (east of Umm As Samim).

Source: United nations Economic and Social Commission for Western Asia (UN-ESCWA, 2013)

Aquifers in the project area include shallow freshwater lenses contain in alluvium, as well as the Umm er Radhuma (UeR). The wells at Abu Thaylah, which is located in the social AOI but outside the hydrology AOI, probably tap shallow freshwater lenses associated with local wadi systems (tributaries to Wadi Umayri).

The UeR is a laterally extensive and probably continuous formation throughout the area. The upper UeR is a laterally extensive aquiclude, with an average thickness of 125 m, which isolates the upper groundwater from useable groundwater below. Within the lower part of the Upper-UeR and top part of Middle-UeR, groundwater exists within narrow and isolated flow paths that are often not laterally extensive. Below is the Middle-UeR which is regionally the principal aquifer horizon. The M-UeR is a confined aquifer, production from which is artisanal. It is almost certain that all M-UeR aquifers are interconnected and may be treated as a single flow regime (UN-ESCWA, 2013).

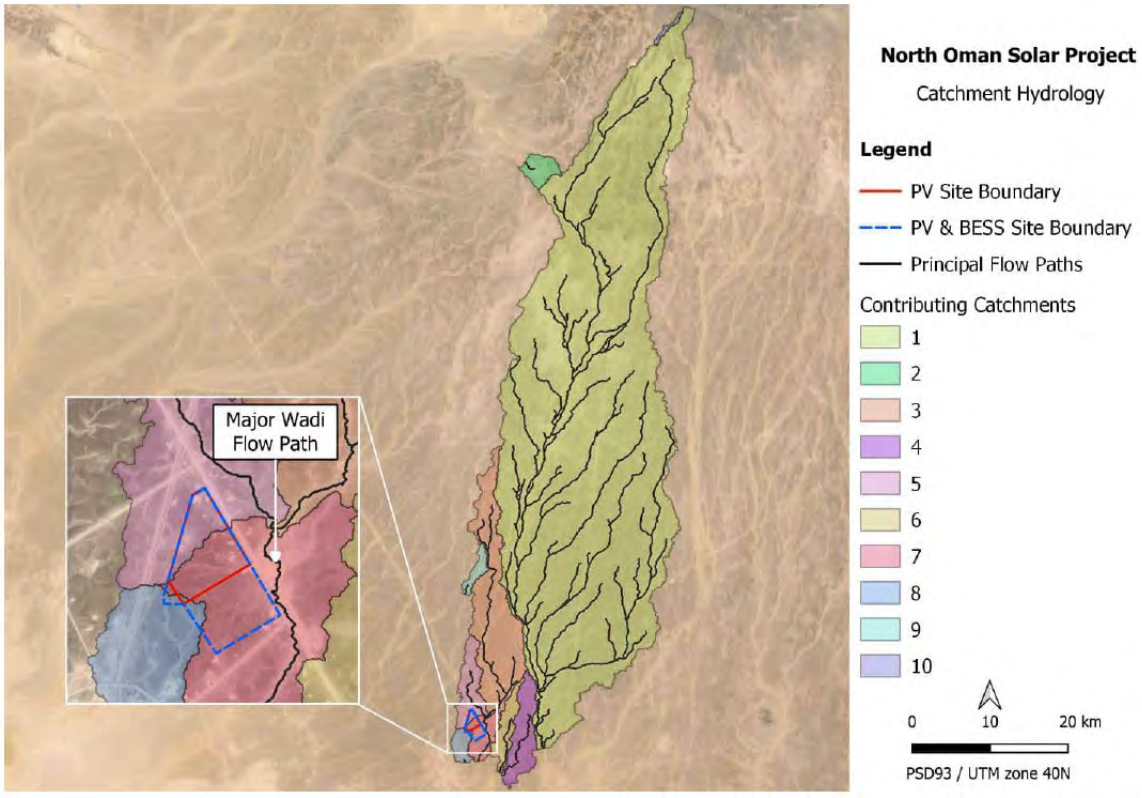
6.1.8 HYDROLOGY

6.1.8.1 CATCHMENTS

The project site is located in the lower alluvial terraces of Oman's Northern Interior Plain which discharges to the Eastern Pediplain to the south (MAFWR, 1990 cited in Workey Consultants, 2024). The site's contributing or nearby catchments slope from the north to the south, and are characterized by shallow wadis, sometimes braided wadi flow paths and flow confluences between catchments. A major wadi flow path runs northeast to the south of the site (Figure 6.26), generating runoff which flows towards and discharges within the east and southeast corner of the site (Worley Consultants, 2024).

Wadis draining these catchments do not flow to the sea but discharge into a system of shallow depressions 6.5 – 8 km to the south of the project, which is clearly seen in the vegetation analysis conducted for the wider project area (see Figure 6.41). Flows have been altered by the construction of paved roads in the area prior to 1985, resulting in ponding on the NE of the road and preventing from flood water from reaching these shallow depressions.

FIGURE 6.26 CATCHMENT IN WHICH THE PROJECT SITE IS LOCATED



Source: Worley Consultants (2024)

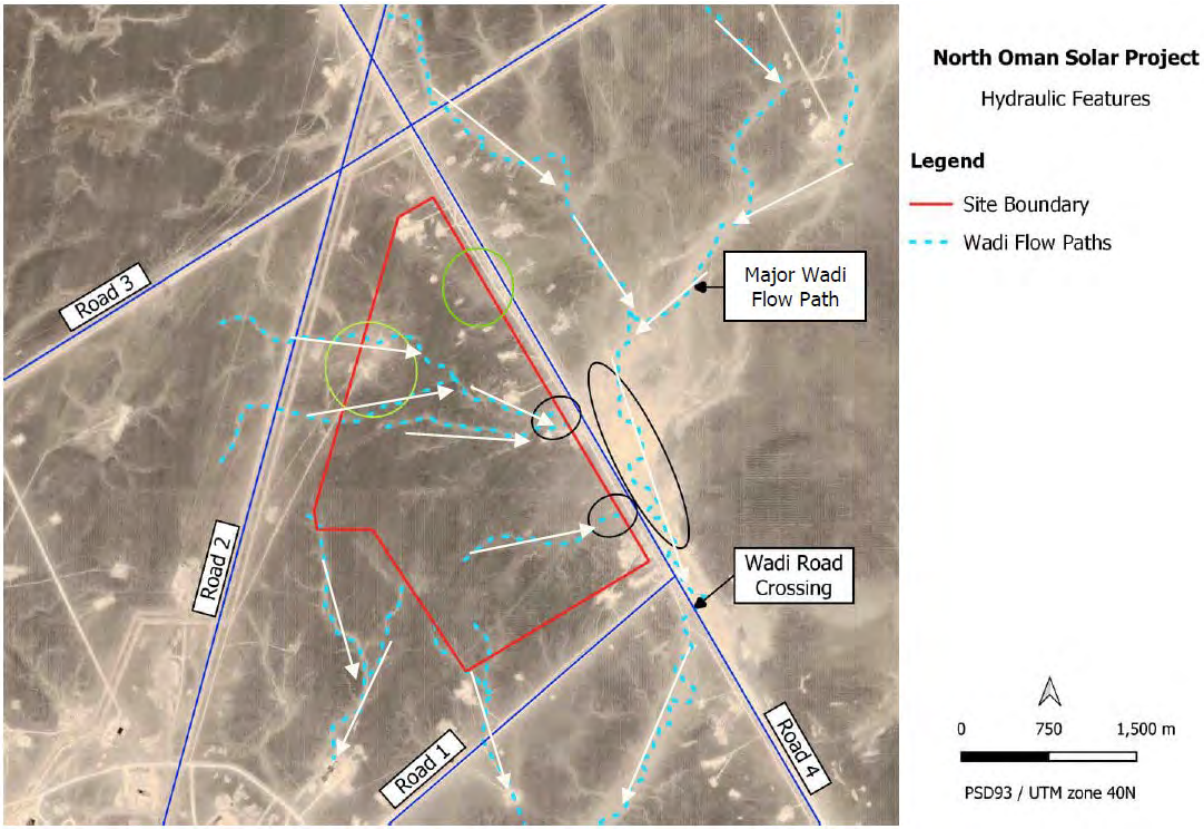
6.1.8.2 DRAINAGE LINES

The site is generally flat with no significant topographic features. Indeed, the site's topography is subtle, with shallow drainage lines of a maximum depth of 1 – 2 m, the most well-developed of which occur in the south of the site, which drain micro-catchments of tens to low hundreds of hectares.

The site drains to its southeast corner, where runoff joins a more developed wadi system (Figure 6.27 and Figure 6.28). Figure 6.27 provides an overview of the hydraulic features on and surrounding the project site, with **black circles** indicating zones of water accumulation observed during the site visit conducted by Worley Consultants on 22 April 2024, green circles indicating potential zone of water accumulation at the site, and **white arrows** flow directions in local drainage channels.

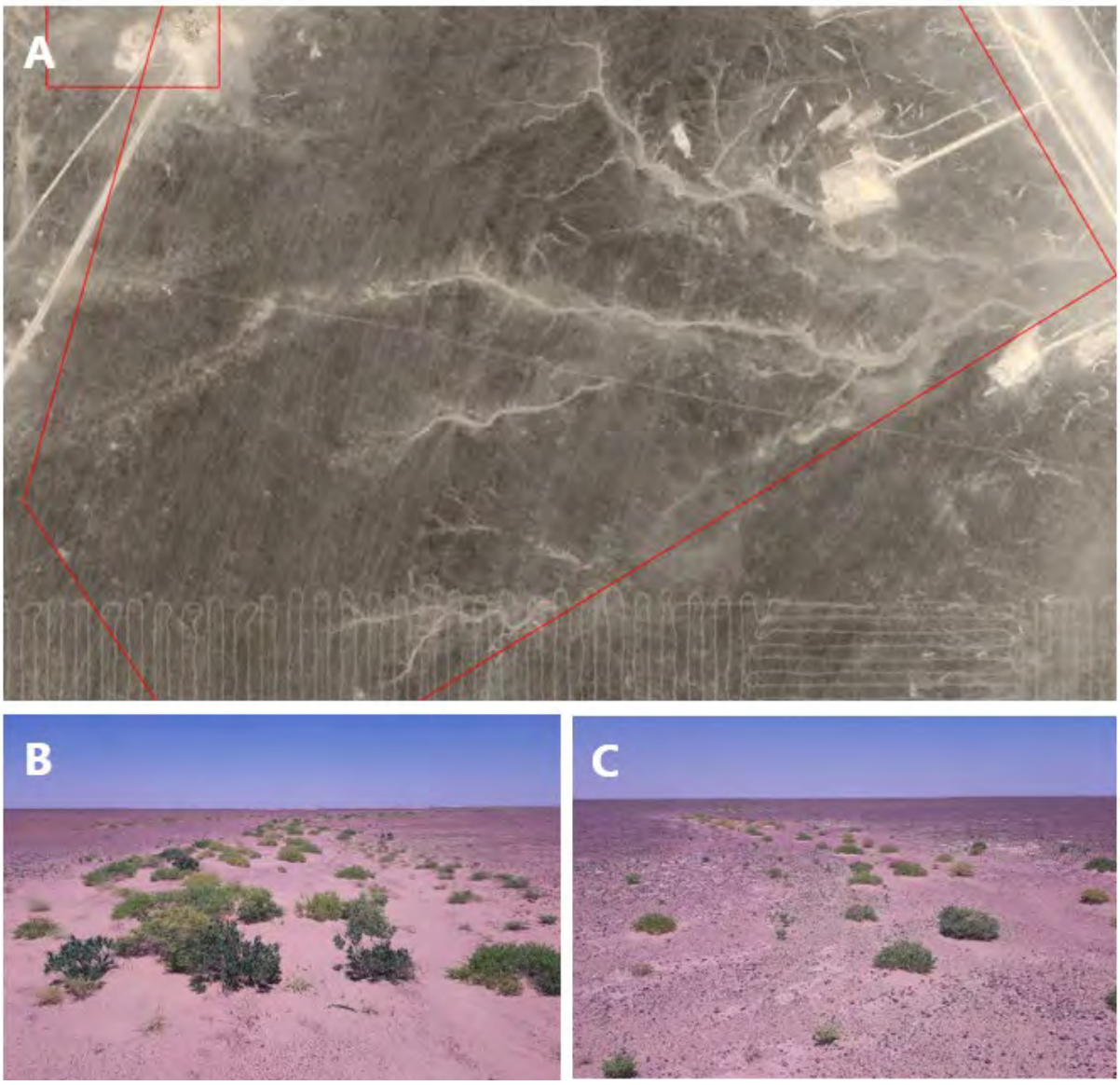
The majority of the run off from the site flows eastsoutheast, but due to the topography of the site small portions of site in the SW flow in a more southerly direction, with some flow from the site draining into shallow depresssions on site which are therefore areas of potential water accumulation during rain. However, drainage lines reaching the eastern boundary of the site are obstructed by the unpaved Road and the associated windrow of uncompacted soil running along side it.

FIGURE 6.27 HYDROLOGY OF THE SITE



Source: Worley Consultants (2024)

FIGURE 6.28 DRAINAGE LINES AT THE PROJECT SITE



A: Drainage lines are evident in the satellite imagery of the southern portion of the site. B and C: Drainage lines as they appear on site. They are subtle topographic features with deeper, sandy soil that supports higher vegetation cover.

Source: 5OES, 2024.

6.1.8.3 SURFACE WATER

There are no surface features on site but following rain that occurred between 15 – 17 April 2024, surface water ponded in small depressions in the Wadi Umayri system. Two of these natural water bodies (ponded water in wadi systems) were sampled (QAWS2 and QAWS3) on 17 May 2024, and a third water sample (QAWS1) was taken from a reverse osmosis evaporation pond discharge, to determine the value of such water bodies to the surrounding ecology (see Figure 6.24 for sampling locations). The results of the laboratory results are summarised in Table 6-8 below, with the full laboratory results given in Appendix G. *Escherichia coli*, copper (Cu), iron (Fe), manganese (Mn) and zinc (Zn) were undetectable in all three samples, and so these have been removed from Table 6-8 below.

TABLE 6-8 LABORATORY ANALYSIS OF SURFACE WATER BODIES NEAR THE PROJECT SITE (MAY 2024)

	Units	Detection Limit	QAWS1 (RO Pond Discharge)	QAWS2 (Wadi)	QAWS3 (Wadi)
Total coliforms	CFU/100mL	1	<1	<1	1.7x10²
pH value @ 25°C	Units	0.1	8.4	7.5	8.1
Alkalinity as CaCO3	mg/L	1	111	42	56
Bicarbonates	mg/L	1	66	51	69
Calcium	mg/L	1	2329	1011	188
Calcium Hardness	mg/L	1	5812	2522	469
Carbonates	mg/L	1	34	<1	<1
Chlorides	mg/L	1	27585	1117	258
Conductivity	mS/cm	0.1	98.4	9.8	2089
Fluoride	mg/L	0.01	6.9	1.22	0.5
Magnesium	mg/L	1	1316	57	21
Magnesium Hardness	mg/L	1	5418	236	87
Nitrate	mg/L	0.1	32.2	1.2	0.9
Potassium	mg/L	0.2	283.8	33.81	4.39
Sodium	mg/L	0.2	17310.9	950.6	173.1
Sulphate	mg/L	1	6363	2786	572
Total Dissolved Solids	mg/L	5	55280	5990	1260
Total Hardness	mg/L	1	11229	2758	555

Unsurprisingly, the water from the evaporation pond discharge (QAWS1), outside the hydrology AOI, had a total dissolved solid (TDS) almost ten times that of the natural surface water bodies that developed following rain in April 2024. Sodium and chloride ions strongly dominate, hardness concentrations are high and the pH is quite alkaline (8.4), all of which are probably caused by the increased calcium hardness resulting from the desalination process. The charge balance of the major ions (3.82 %) suggests that there are no major exotic ions present. Nitrate concentrations were moderate, which was causing quite luxuriant growth of filamentous cyanobacterial mats in the effluent stream, which in turn were the basis of a simple food web of invertebrates (insects), and insectivorous birds.

The first water sample taken from temporary surface water (QAWS2) was taken from the wadi closest to the site (6.5 km to the SE of the project site), (see Figure 6.40 for a photograph of the location), approximately 30 days after rain fell on the 15 -17 April 2024. No fecal coliforms

(*E. coli* and total coliforms) were detected, demonstrating that the water is free from fecal contamination. The water is slightly hard with a pH just above neutral (7.4). The major cations and anions are approximately balanced (+4%) indicating that the major ions account for 96% of the charge balance and no significant concentration of other elements are present. The dominant salts that have dissolved in water are sodium chloride (NaCl) and gypsum ($CaSO_4$), which have leached from the surrounding soil. Other salts also present (e.g. $MgSO_4$ and MgCl), which may precipitate out as the water dries. Plant nutrient concentrations are low: nitrate 1.2 mg/l, and potassium 33 mg/l; which explains why the water was clear with no phytoplankton or bacterial bloom.

The second sample from a natural, temporary surface water feature (QAWS3) was obtained from an isolated pool in the Wadi Umayri system approximately 10 km NE of the project site, outside the hydrology AOI. The pool was slightly contaminated with coliforms (170/ml), most likely from livestock that forage in the wadi bed. The TDS concentration (1260 mg/l) is around 4 times lower than the natural body of water downstream of this site in Wadi Umayri, but it still contains traces of sodium chloride and calcium sulphate (gypsum). The cations and anions in solution are approximately balanced (-4.8%), and the pH is 8.1, so somewhat alkaline.

The only surface water feature within the AOI was short term ponding in a wadi bed, a branch of Wadi Umayri (1.5 km to the SE of the project site), that formed after rain in April 2024. Evidence from camera trap data indicated that by 25 May area was dry again. Results show that salt and gypsum in native soils dissolve in run off water, but in other respects run off from the area is uncontaminated. Insight into the quality of surface water bodies has a bearing on several aspects of the project such as i) their influence on bird ecology in the area, and how birds may interact with the project, ii) the expected quality of storm water run off from the site given the soils' salt and gypsum content, and iii) chloride corrosion risk to reinforced concrete structures coming into contact with slightly brackish stormwater run off.

6.1.9 LANDSCAPE AND VISUAL AMENITY

6.1.9.1 OVERVIEW

The following sources have been used to obtain information on potential landscape and visual receptors and baseline conditions and sensitivities:

- Satellite imagery from online sources.
- Visits to the study area to collect baseline data and observations, and to take viewpoint photography (taken in May and June 2024, see Figure 6.31 for location).
- Engagement with stakeholders at the Wali of Adam's offices on 14 July 2024.

6.1.9.2 ZONE OF THEORETICAL VISIBILITY

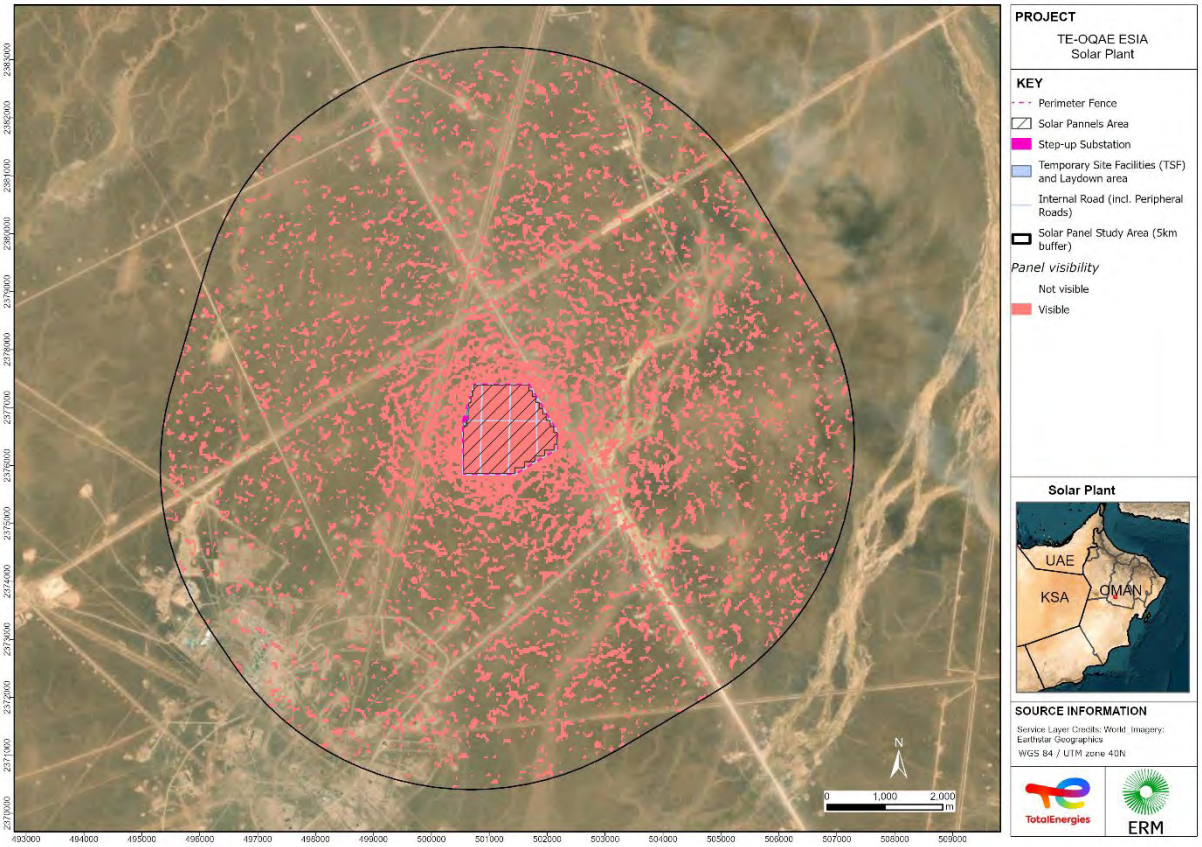
As described briefly in Table 6-1, an area of influence (AOI) of 5 km has been adopted which defines the extent of the baseline for landscape and visual amenity.

The Zone of Theoretical Visibility ZTV for the project has been determined using ESRI ArcGIS software using a a digital terrain model (DTM) based on National Survey Authority (NSA) topographic data with 20 m contour intervals and interpolated to achieve 5 m contour intervals. The ZTV assumes a panel height of 3 m above existing ground level, which will be fenced with a chain linked fence to which shade cloth is attached. The assessment also takes in to consideration temporary and permanent facilties required during construction and operation

of the site, as well as associated facilities such as the off-taker's substation and transmission lines from the facility to the substation.

This approach does not take into account any small scale topographic features or other features that may obsure or block visibility such as tree cover. However, given the flat nature land the absence of tree cover in the AOI, the theoretical limits of visibility is considered to be a good estimate of actual visibility (Figure 6.29). The analysis shows the visibility of the project in the landscape AOI.

FIGURE 6.29 ZTV FOR QARN ALAM SOLAR FARM



Source: ERM, 2024

6.1.9.3 LANDSCAPE BASELINE CONDITIONS

The landscape baseline forms the basis for the identification and description of the changes that may occur to the character of the landscape as a result of the construction and operation of the Project. The following presents a summary of the baseline landscape features that are used to define landscape character areas.

- **Land Use**: The Project site is located in PDO's Block 6. The land use of the surrounding areas (within 5 km) is therefore associated with PDO's oil and gas activities and related land uses and infrastructure (oil rigs, mud pits, pipelines etc.), see Figure 6.12 for an indication of the extent and proximity of these activities. The oil field at Saih Nihaydah Surface indications show that this land has been systematically and extensively seismically surveyed. The footprint of the Project site is undeveloped although in areas land has been disturbed by earthworks, particularly along its eastern boundary, where borrow pits have been opened and used to source fill material for construction of unpaved roads. Extensive vehicle tracks across the site, including from seismic surveys, are also visible in the soil

surface. Based on camera trap information (13 May – 30 June 2024), the Project site is used intermittently by camels that range freely in the area to graze.

- **Settlements**: There are no permanent settlements in the landscape AOI. However, contractor camps are present in Saih Nihaydah approximately 5 km to the SW of the project boundary, on the edge of landscape AOI.
- **Landform and Topography**: The topography of the Project site and the surrounding area is predominantly flat. A tributary of Wadi Umayri with scattered trees is located to the SE of the project within the landscape AOI. The most significant landscape features in the project area are emergent diapirs (salt domes) at Kibrit 13 km to the east and Qarn Alam 23 km to the SE, both of which are outside the landscape AOI.
- **Habitats and Vegetation**: The Project site is characterised as barren gravel plain, with patches of gravel and sand plains with dwarf shrubs (less than 1 m). The natural landscape of the surrounding area have been heavily modified by road and oil and gas facilities construction, excavation, vibroseis surveys and livestock grazing giving an overall impression of a modified and somewhat degraded landscape character.
- **Access**: The main access road to the Project site is via Route 31, which runs around 27 km to the east at its closest point. From Road 31 the Project site is reached on unpaved roads from Ghabah or from Qarat Al Milh.
- **Hydrology**: The Project site is naturally drained by small channels vegetated with dwarf shrubs (see Figure 6.28). These are active only during significant rainfall events which typicall occur every few years (see Climate Section for more details).

Landscape Character Types

There is no formal landscape characterization taxonomy for Oman. A biome classification system with 111 classes developed for the Arabian region by Parr et al. (2014) provides a framework for defining landscape character areas on a large scale. The project site falls on the boundary between inland gravel plains and the Dhofar Plateau, which are similar from a landscape perspective but differ in various ecological aspects.

From a landscape character perspective, both biomes are flat, largely featureless gravel desert plain which provide uninterrupted views of the horizon in all directions. The desert plain is treeless over large areas with minimal vegetation except in wadis and subtle depressions where soil is slightly thicker and where flood water accumulates after heavy rainfall.

On the scale of the landscape AOI for the project, taking the prominent landscape features described above and considering the biome classification system of Parr et al. (2014), three landscape character types have been defined:

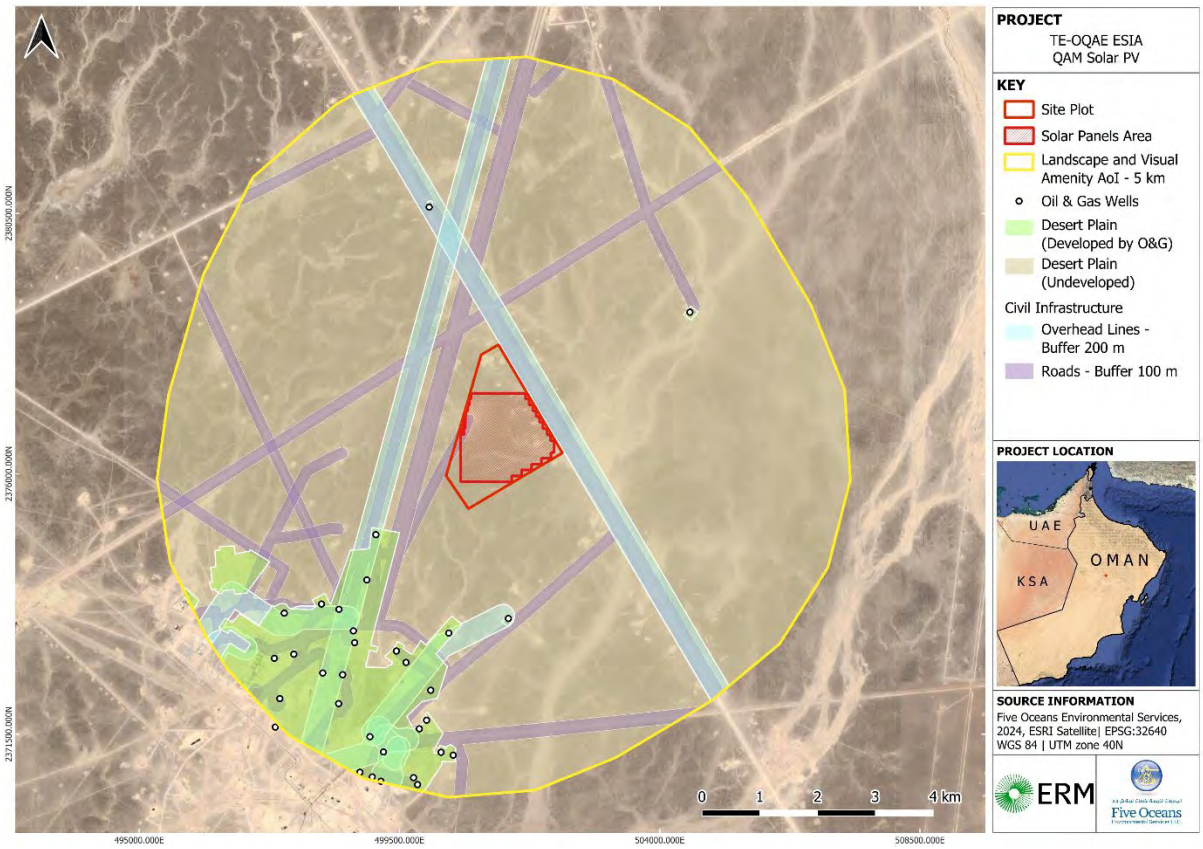
1. **Undeveloped desert plain**: relatively undisturbed areas of open desert, largely featureless except for low rocky ridges, subtle depressions and drainage lines. The plains support very limited vegetation because of the thin soil layer underlain by thick limestone and arid conditions. However, where soil is a little thicker, particularly in wadi beds scattered *Vachellia tortilis* trees and dwarf shrub communities have developed. Expansive desert rangeland is used for extensive camel grazing, with small groups of up to 6-8 animals being typical, most often untended but occasionally attended by a herder in a 4x4. In the project AOI herding activity is conducted from home bases in Abu Thaylah.
2. **Desert plain developed by the oil and gas industry:** areas of desert plain where commercial oil and gas resources have been developed have modified the landscape in a

manner that fundamentally changes its character. Such areas have the same basic topographic and geological features, but have been modified by extensive earthworks and engineered structures. Earthworks remove the surface gravel layer, revealing lighter coloured soil and rock beneath which contrasts with darker undisturbed soils in the surrounding areas, making it easy to visually distinguish one from the other. Drilling pads and unpaved roads, constructed from compacted soil scraped from the surrounding areas, are engineered features that also contrast with the natural landscape. These are topped with well heads, flow lines, and overhead power lines that introduce colour, form and texture that contrast with those of undisturbed areas. The centralized infrastructure at Saih Nihaydah is included in this category.

3. **Urban Centers and Civil Infrastructure:** Civil infrastructure in the AOI is limited to unpaved road and overhead power lines. A buffer of 100 m and 200 m has been applied to unpaved roads and overhead powerlines, respectively, to account for their visual intrusion on the landscape.

The landscape character at the Project site itself falls into the 'Undeveloped Barren Desert Plain' category, as shown in Figure 6.32. The Project site does not sit within any national landscape designation. The landscape and visual amenity of the site is assessed as being of low value.

FIGURE 6.30 LANDSCAPE CHARACTER TYPES WITHIN THE STUDY AREA



Source: 5OES, 2024

6.1.9.4 VISUAL BASELINE

This section considers receptors in the ZTV (Figure 6.29) including view points from publicly accessible locations. Visibility of the project site is equal from all directions since there are no

significant topographic features in the AOI. Visibility is somewhat limited by the generally dusty conditions, and by heat haze, particularly during summer months.

Valued Views

Valued views would be views identified by an authority or a body which are likely to be protected. They might include an important building or structure in the view or include a natural landscape feature. There are no valued views within the study areas and no National Scenic Reserves in the project area.

Settlements and Residential Receptors

There are no permanent settlements in the Landscape AOI. Oil field workers are accommodated in the contractor's camp at Saih Niyahdah, which is 5 km from the solar farm site to the SW. Occupants of the camps are in the area to work in the oil and gas sector, and are not permanent residents, having frequent work periods on site alternating with time offsite. These camps have limited soft landscaping and views are interrupted by buildings and hard landscaping (e.g., plot boundary walls). Occupancy is greatest overnight, from sundown to sun rise, when workers are transported to their work place in the oil fields and associated facilities, although a small proportion of the work force spend the majority of their day at the camp in offices.

Road Users

Road 31 is mostly the main road connecting Nizwa and Thumrait, so road users are a mixture of local traffic and those making long-distance journeys. During the *khareef* season (June – September) domestic tourists drive from Muscat to Salalah along Road 31. However, the majority of road users are travelling for work or commerce, and the proportion of tourists, domestic and international, that take this route is expected to be small, less than 5% of all vehicles. Road 31 is 27 km to the east of the site, and therefore outside the Landscape AOI, and the project will not be visible from this distance. The site is also served by a network of unpaved roads that service the oil fields as well as the communities in the area.

Representative Viewpoints

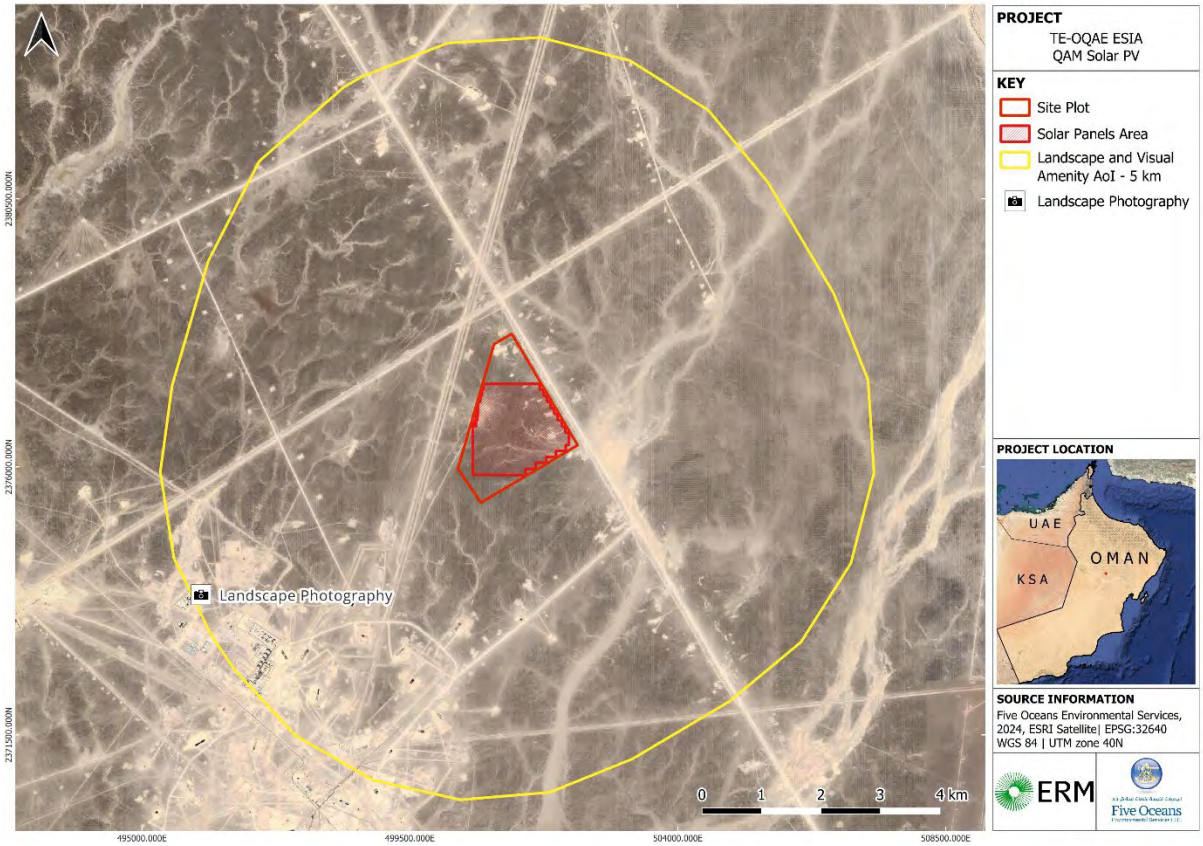
Based on the above information, one viewpoint has been selected as representative of the visual amenity from the contractors' camps at Saih Nihayadah. Details of the viewpoint are given in Table 6-9 and its locations is shown in Figure 6.31.

TABLE 6-9 DETAILS OF VIEWPOINT AT SAIH NIHAYDAH

Location and type of receptor	**Coordinate**	**Reason for selection and Distance to Development.**
QAS Viewpoint 1		
Contractors' Camp at Saih Nihaydah	N 21°28'1.77" 56°57'40.76"	This camp is the only receptor in the AOI 4.8 km
Viewpoint Description and Value		
This viewpoint is located in the car park outside the camp so provides an unobstructed view of the project area. Views from within the camp are obstructed by the packing of the accommodation units and the boundary fence (chain linked fence with shade cloth		

Location and type of receptor	Coordinate	Reason for selection and Distance to Development.
attached). The gathering station at Saih Niyhaydah lies around 1 km to the SE of this location, which includes visually intrusive features such as overhead transmission and distribution lines, flare stacks, liquid bulk storage tanks, oil processing facilities, the power plant, warehousing and other low rise developments such as other contractors' camps. The car park is unpaved and is surrounded on its SE boundary with a low earth bund which partically obstructs views in this direction. The value of the view from this location is Low reflecting the distance to the site which is at the edge of the ZTV, similarity with other viewpoints, the low sensitivity of the receptor, and the homogeneity of the landscape.		

FIGURE 6.31 LOCATION OF LANDSCAPE PHOTOGRAPHY



Source: 5OES, 2024

Figure 6.32 presents photography taken from a view point within the landscape and visual amenity AOI (5 km) adjacent to Saih Nayhadah contractor's camp, considered to be a potentially sensitive visual receptor. Service roads in the area are not considered sensitive receptors as they are not public roads, and users are heavily dominated by contractors servicing the surrounding oil and gas production activities. The top photograph (A) is orientated towards the project site, and the lower photograph was taken facing the southeast orientated towards the gas processing facility at Saih Nihaydah. The latter indicates the already partially industrialised character of the landscape associated with hydrocarbon production activities in the project area. Such photography illustrates the quality of the landscape as a baseline for the visual impact assessment.

FIGURE 6.32 VIEWS FROM VIEWPOINT AT SAIH NIHAYDAH

These photographs were taken at the location indicated in Figure 6.32 on 30 June 2024. A: View towards the project site looking NE; white arrow indicates the approximate location of the project site. B: View towards Saih Nihaydah looking SE. (Source: 5OES, 2024)

6.2 TERRESTRIAL ECOLOGY

6.2.1 OVERVIEW

This section identifies the Project AoI and study area for the terrestrial biodiversity assessment and describes the baseline characteristics of the selected study area. The baseline was characterised by sourcing information and data from official websites and reliable data sources, as well as site-specific field surveys and engagement with key stakeholders.

6.2.2 AREA OF INFLUENCE (AOI) AND STUDY AREA

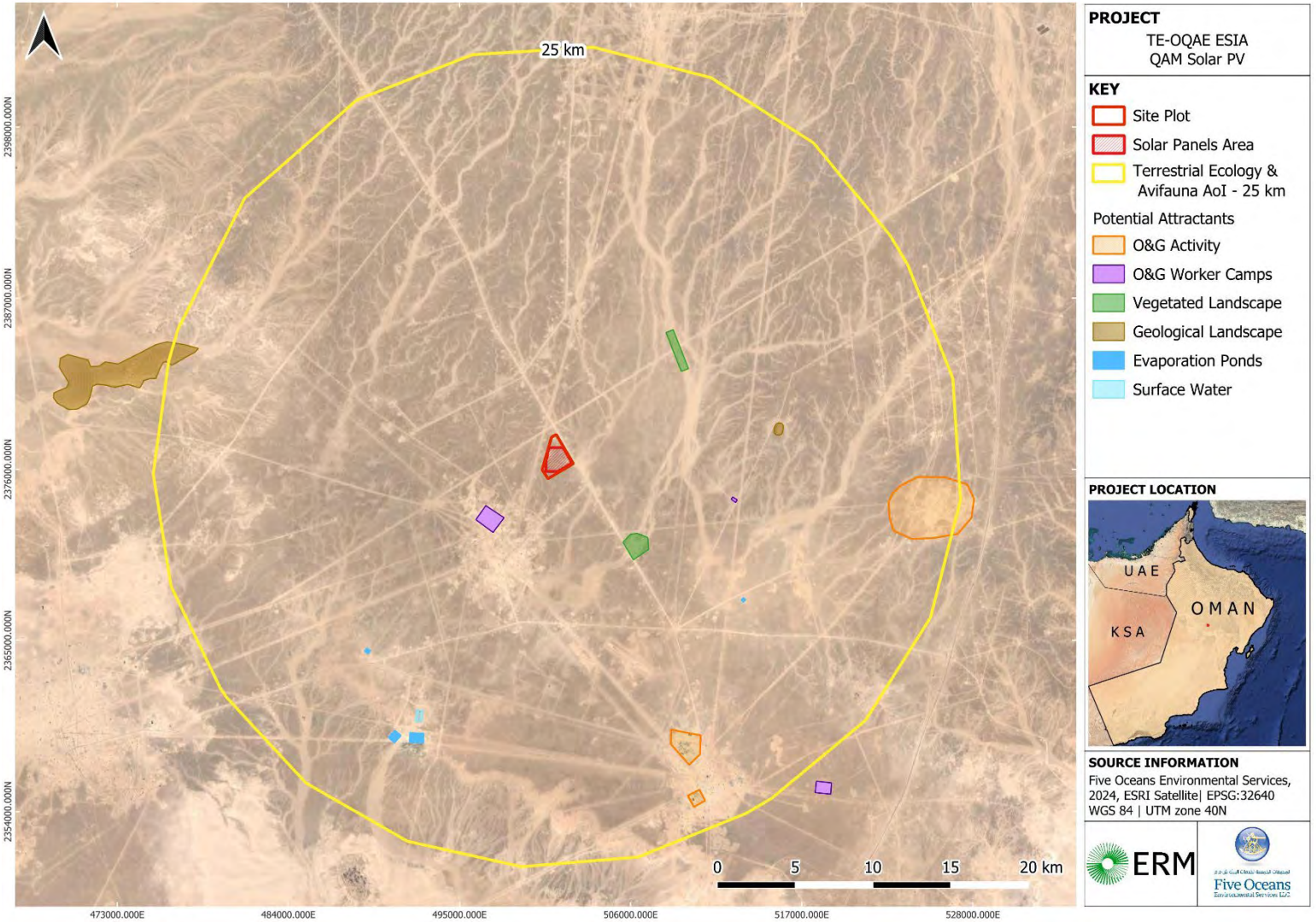
The main terrestrial ecological sensitivities of the Project site fall into three receptor groups: i) habitats at risk ii) flora of conservation concern; and iii) fauna of conservation concern.

Two AoIs have been established for the receptors identified taking into consideration the ways in which the project will affect receptors, their sensitivity and distribution, as outlined below:

- Habitat Loss and Direct Mortality: **Physical footprint of the Project site** and associated facilities to account for direct habitat loss and consequent effects on fauna and flora.
- Habitat Fragmentation and Disturbance: Physical footprint of the Project site and a 5 km buffer for terrestrial ecology and a 25 km buffer for birds, to account for the phenomenon of the barrier effect.
- Displacement: Physical footprint of the Project site and a 5 km buffer for terrestrial ecology and a 25 km buffer for birds, to account for the secondary impacts of displaced wildlife.

The primary ecological justification for the 25 km AoI for birds is that it includes surface water features and other habitats (vegetated wadis and sand dunes) that influence the distribution and movement of birds in the AoI (see Figure 6.33 for further details).

FIGURE 6.33 TERRESTRIAL ECOLOGY AND BIRD AOI



Source: ERM & 5OES, 2024

FIGURE 6.34 BIRD ATTRACTORS IN THE AOI

Top Right: Vegetated wadi bed, part of Wadi Umayri, 9.6 km NE of the site. Middle Right: Vegetated wadi bed, a tributary of Wadi Umayri, 6.5 km SE of the site. This area floods during rain events, with ponded water remaining for 4-6 weeks. Bottom Right: Brine overflow from RO evaporation pond which feeds a small saline wetland (out of shot). Bottom Left: Lined RO evaporation ponds and groundwater storage reservoirs. All photographs were taken 15 – 17 May 2024. Source: ERM, 2024.

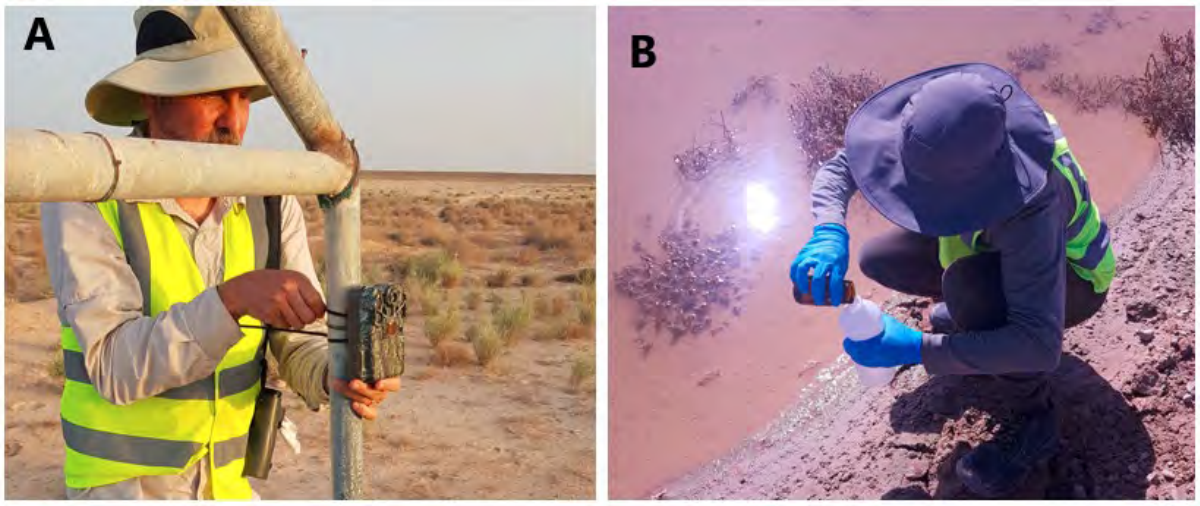
The approach to characterising the terrestrial ecology and biodiversity of the Project site has been as follows:

- Review of available information from the scientific literature, published and unpublished reports.
- Habitat (AOI 5 km) and vegetation mapping (AOI 25 km) using remote sensing
- Site visits on 13 and 17 May, and 30 June 2024 to conduct the following surveys, building on the Scoping Report site visit conducted which was conducted on 15 November 2023:
  - Drive over survey to make general ecological observations (particularly relating to plants, reptiles, birds, land use and habitat condition), ground control point observations relating to habitat types.
  - Installation of three camera traps (one on the project site and two in the project vicinity, see Figure 6.35.

- A screening critical habitat assessment (CHA) aligned with IFC PS 6 on biodiversity, using as main source filed surveys and IBAT report.

Field surveys in November 2023 and May 2024 were conducted by two senior field ecologists with 15-25 years of experience in Oman, one an ornithologist the other a general ecologist, supported by a field technician, while the site visit conducted in June 2024 was conducted by a junior ecologist supported by a field technician. During all site visits conditions were favourable for conducting the necessary surveys. The November 2023 site visit coincided with the autumn bird migration, while the site visits in May and June coincided with the summer bird season during which resident breeding species would be present. Bird species determinations were made in the field by the senior ornithologist, and plant and reptile species were determined from photography by recognised expert taxonomists.

FIGURE 6.35 ENVIRONMENTAL SURVEY METHODS A: CAMERA TRAPPING. B: SURFACE WATER SAMPLING



Source: 5OES, 2024.

Finally, for the majority of species their conservation status has been based on IUCN Red List status as provided by accessing IUCN's online portal. The Plant Red List Book for Oman (Patzelt et al., 2014) has been used to determine the national conservation status of plant species observed on site, while regional assessments of carnivorous mammals (Mallon et al, 2011) and breeding birds Red List of Arabian Breeding Birds (Symes et al 2015) have informed the conservation status of these groups.

The baseline data and information from review of existing information and from the results of surveys have been compiled into the following sections that describe the ecological baseline of the study area.

6.2.3 PROTECTED AND RECOGNISED AREAS

6.2.3.1 NATIONAL CONSERVATION SITES

The Project site is not located in or near a National Nature Reserve (NNR) or other level of protection or interest that would indicate that the site has any specific conservation value (Figure 6.36). The closest Natural Reserve to the Project site is Jebal Akhdar National Scenic Reserve, 200 km to the north, the Barr Al Hikman coastal reserve at 150 km to the south east, and the Al Wusta Wildlife Reserve which is also around 160 km to the south-east.

6.2.3.2 KEY BIODIVERSITY AREAS / IMPORTANT BIRD AND BIODIVERSITY AREAS

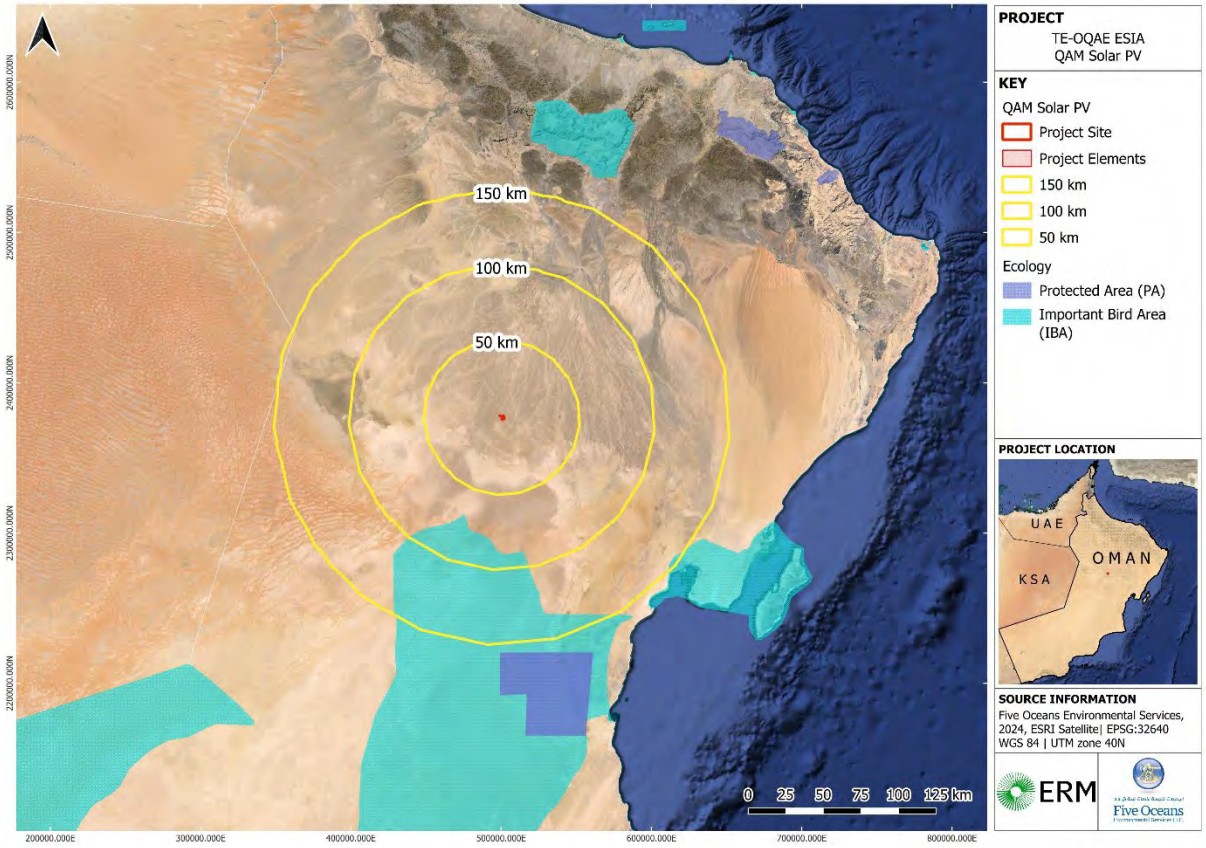
Key Biodiversity Areas (KBA) are sites that contribute significatively to the global persistence of biodiversity (IUCN, 2023). These areas support the highest biodiversity and important ecologically productive areas. KBAs are therefore considered priority areas to safeguard the planet's overall ecological health and conserve biodiversity. Important Bird and Biodiversity Areas (IBAs) are a sub-category of KBAs. IBAs are identified and registered by BirdLife International using an internationally agreed set of criteria designed to form a network of locations that together contribute to the conservation of birds at a global scale.

KBAs/IBAs are not nationally protected but are internationally recognized sites identified by Birdlife International as being of conservation importance for birds.

The nearest IBA to the Project site is the Jiddat Al Harasis (see Table 6-10 for its key characteristics), whose nearest point is around 60 km to the south of the Project site. The link between the site and the Jiddat Al Harasis relates to bird migration: a proportion of birds migrating southward during the autumn migration season will first pass through the NOS site and onwards through the IBA, and during the spring migration, a proportion of birds will fly northward from the IBA through the project site. Other IBAs, such as Jebal Akhdar IBA and Bar Al Hikman IBA, are +180 km and +140 km to the north and south east of the Project site.

In addition, there are no World Heritage Sites, or Alliance for Zero Extinction sites within a 50 km radius of the project site.

FIGURE 6.36 PROTECTED AREAS AND RECOGNISED AREAS



Location of Solar Farm is indicated with a red dot.

Source: 5OES, 2024

TABLE 6-10 KEY CHARACTERISTICS OF THE JIDDAT AL HARASIS IBA

IBA	Size (km^2)	Description	IBA Trigger Species
Jiddat Al Harasis	27,500	A limestone plateau with sandy depressions, sand/gravel plains, karst, sand-dunes, hills and escarpments, ranging from 20 to 200 m elevation. Vegetation consists mainly of sparse, low shrubs and ephemeral grasses. The area is relatively well-vegetated, given the low average annual rainfall, due to regular condensation of fog moisture blowing in off the sea. (~65 km from the project boundary)	Resident populations of: • Crowned Sandgrouse (*Pterocles coronatus)* (IUCN – LC) • Asian Houbara (*Chlamydotis macqueenii)* (IUCN VU) • Brown-necked Raven (*Corvus ruficollis)* (IUCN LC) • Greater Hoopoe-lark (*Alaemon alaudipes)* (IUCN LC) • Bar-tailed Lark (*Ammomanes cincture)* (IUCN LC) • Black-crowned Sparrow-lark (*Eremopterix nigriceps)* (IUCN LC) • Arabian Lark (*Eremalauda eremodites)* (IUCN LC) • Desert Wheatear (*Oenanthe deserti)* (IUCN LC)

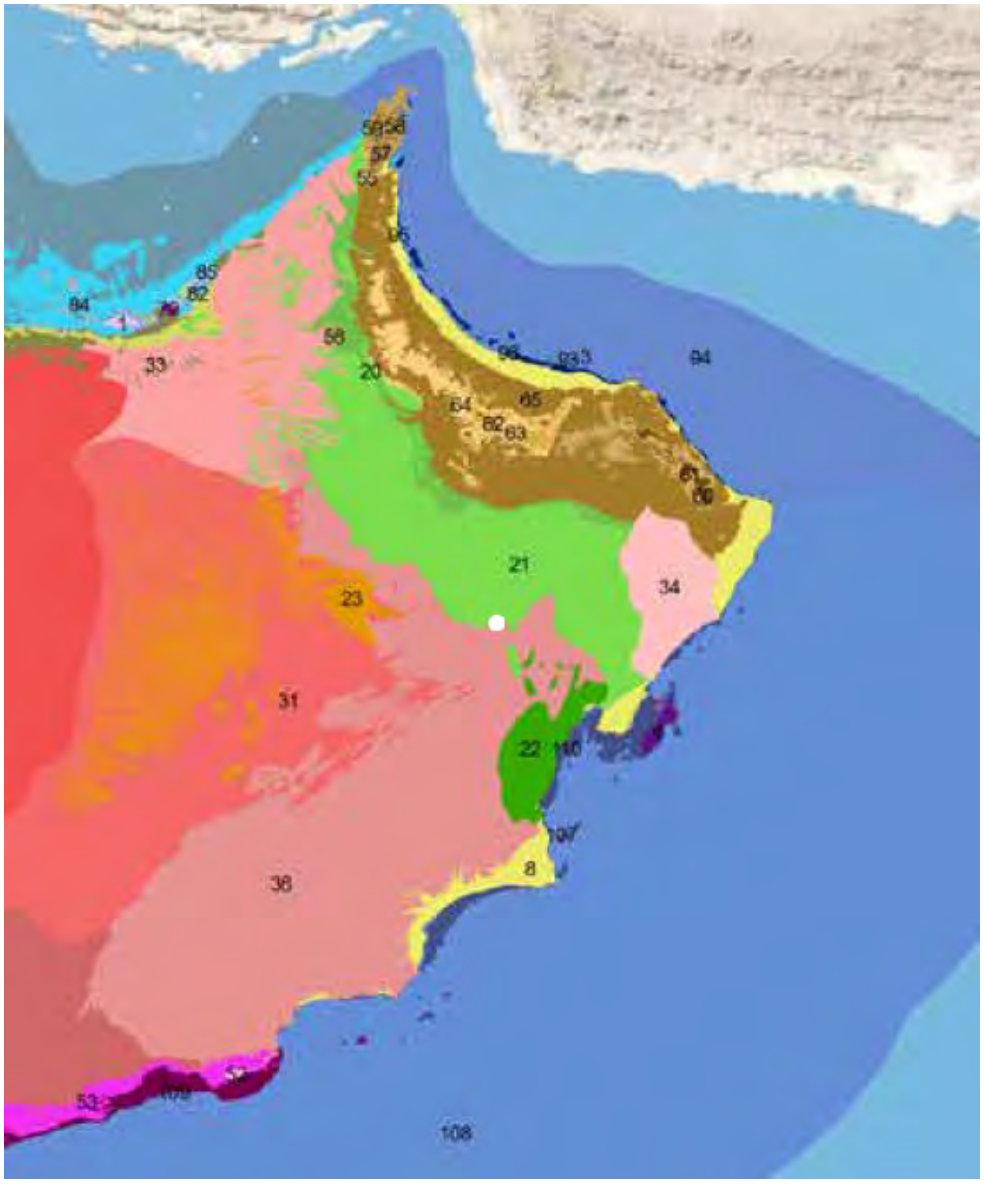
Source: 5OES, 2024

6.2.4 HABITATS

6.2.4.1 ECOLOGICAL CONTEXT

The biotopes of the Arabian Peninsula are shown in Figure 6.37, which provides a broad ecological context for the project site (Parr et al., 2014). It is first integrated map of biomes for the entire Arabian Peninsula and identified 111 biomes across the region. The project is located in the boundary between the gravel plains of the northern central desert and the Dhofar Plateau. These deserts are similar in their general characteristics but exhibit subtle differences in their species composition, which at this location is minimal.

FIGURE 6.37 ECOREGIONS OF OMAN AND WIDER ARABIAN PENINSULA



Project location marked with white dot. Habitats shown above include: 21 (light green) Inland Plains and Sabkha *Eastern Gravel Plain*; 36 (dark pink) Plateaux *Dhofar Plateau*; 23 (orange) Inland Plains and Sabkha *Inland Sabkha*; 22 (dark green) Inland Plains and Sabkha *Huqf – Plain, Outcrop & Dune*; 65 (brown) Mountains and Hills Hajar Mountains *below 500 m.*

Source: Parr et al., 2014

Desert habitat in northern central Oman is characterised by expansive flat plateaus drained by a network of wadis and scatted with a *Vachellia* (*Acacia*) dominated tree community in places. Occasional rainfall provides the primary source of water that sustains the ecology, and indeed in April 2024 heavy rain fell at the site. When the humidity is high, brought to the central desert by wind from the south (summer months during the khareef) or from the north (winter months during shamal winds), and from time to time nighttime temperatures fall below the condensation point, forming dew that supplements the infrequent rain fall.

The northern central desert falls floristically into the Arabian regional subzone of the Saharo-Sindian phytochorion (Ghazanfar, 1998). Generally, and this is the case on the project site, the vegetation in the central desert is sparse with low species richness and belongs to the most

dominant vegetation unit - *Acacia-Tetraena* (formerly *Zygophyllum*)-*Heliotropium* vegetation unit (Ghazanfar, 2003).

The tree/large shrub community of the gravel plains is dominated by *Vachellia* (*Acacia*) *tortilis*, *V. flava*, *Ziziphus leucodermis* and *Prosopis cineraria* and *Rhazya stricta*, *Pulicaria glutinosa* and *Tetraena* spp. are the dominant dwarf shrubs and forbs (Ghazanfar, 1998). Several grass species occur on the gravel plains with *Stipagrostis* species being an important species. Five of these six species characteristic of the South Arabian Plains and Plateau Desert occur on the site or in the vicinity, with only *Ziziphus leucodermis* not observed.

6.2.4.2 HABITAT MAPPING

The habitat classification system developed by Brown and Boer (2004) has been adapted as the basis for habitat mapping applied at this site. Minimum mapping units have been adjusted to be suitable for mapping at smaller scales, key species in the habitat types adjusted to reflect the ecology of Oman's central deserts, and some of the land use categories have been merged (e.g., oil and gas infrastructure, roads, pipelines etc.). The terrestrial habitats in the Project AoI fall in to six categories (corresponding to colours in Figure 6.38):

1. Gravel hills with rocky outcrops (orange)
2. Gravel plains with dwarf shrub cover (pale yellow)
3. Wadis in open terrain (dark blue)
4. Drainage channels over sparsely vegetated gravel plains (light blue)
5. Paved and unpaved roads (dark grey)
6. Industry and infrastructure (red).

Of the habitat types listed above, the first six are **natural habitats**. Disturbed ground is highly **modified habitat** that would require intervention on a spectrum from light touch to requiring re-engineering in order to restore its condition to being ecologically functional. The last two habitats, in fact land uses rather than habitats, are listed here for completeness rather than having any ecosystem function or biodiversity value.

Habitats have been mapped using Sentinel satellite imagery for the Habitat AOI (5 km), and ground control points (GCP) have been used to validate the boundaries of habitat types.

Applying the habitat classification system described above, all terrestrial habitats on site fall into four categories: i) barren, sparsely vegetated gravel plain, ii) gravel hills with rocky outcrops, iii) gravel and sand plains with dwarf shrub cover, with iv) drainage lines with sparse vegetation. These are described in Table 6-11.

6.2.4.3 HABITAT DISTRIBUTION

Habitats found on the project site are a sub-set of habitats occurring in the Habitat AOI. Wadi habitat is open terrain occurs in the vicinity, whereas only drainage lines occur on site. The difference between the wadi habitat and the drainage line habitat is a matter of scale: wadis near the project are wider and have greater tree cover (*Vachellia tortilis* and *V. flava*), and a more diverse understory, whereas drainage lines on site are minor tributaries to the wider wadi system and support a less diverse floral community that do not include trees.

The influence of surrounding oil production and processing on the surrounding habitats is also clear from the figure below, showing as disturbed ground (borrow pits, construction areas, and infrastructure), both in the collection centers and individual well pads as well as long the

graded road network. Ground disturbance associated with roads (work area either side of the roads and borrow pits used to obtain fill for road construction) is evident and contributes to the overall footprint of disturbance caused by road construction.

To summarise, habitats on site are similar to those found in the surrounding 5 km radius which are dominated by barren gravel plains, gravel plains with dwarf shrub cover and contain vegetated drainage lines on site, while larger wadis are present in the surrounding area. Habitats surrounding the project site are heavily disturbed where oil activities and associated infrastructure, including an unpaved road network, have been developed.

FIGURE 6.38 HABITAT MAPPING OF THE PROJECT AOI FOR TERRESTRIAL ECOLOGY (5KM) COLOURS USED TO REPRESENT DIFFERENT HABITAT TYPES IN THE MAP ARE GIVEN ABOVE

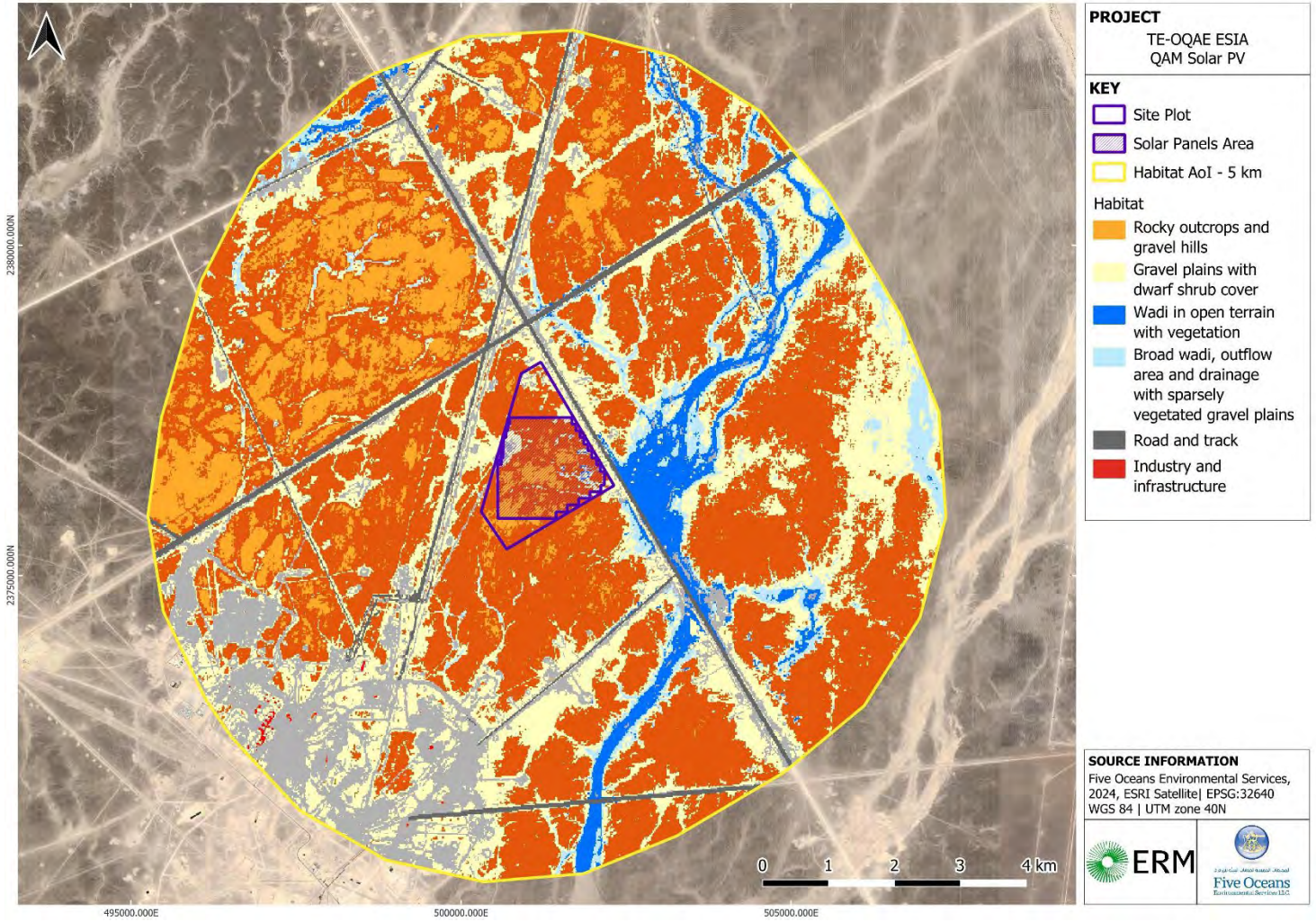


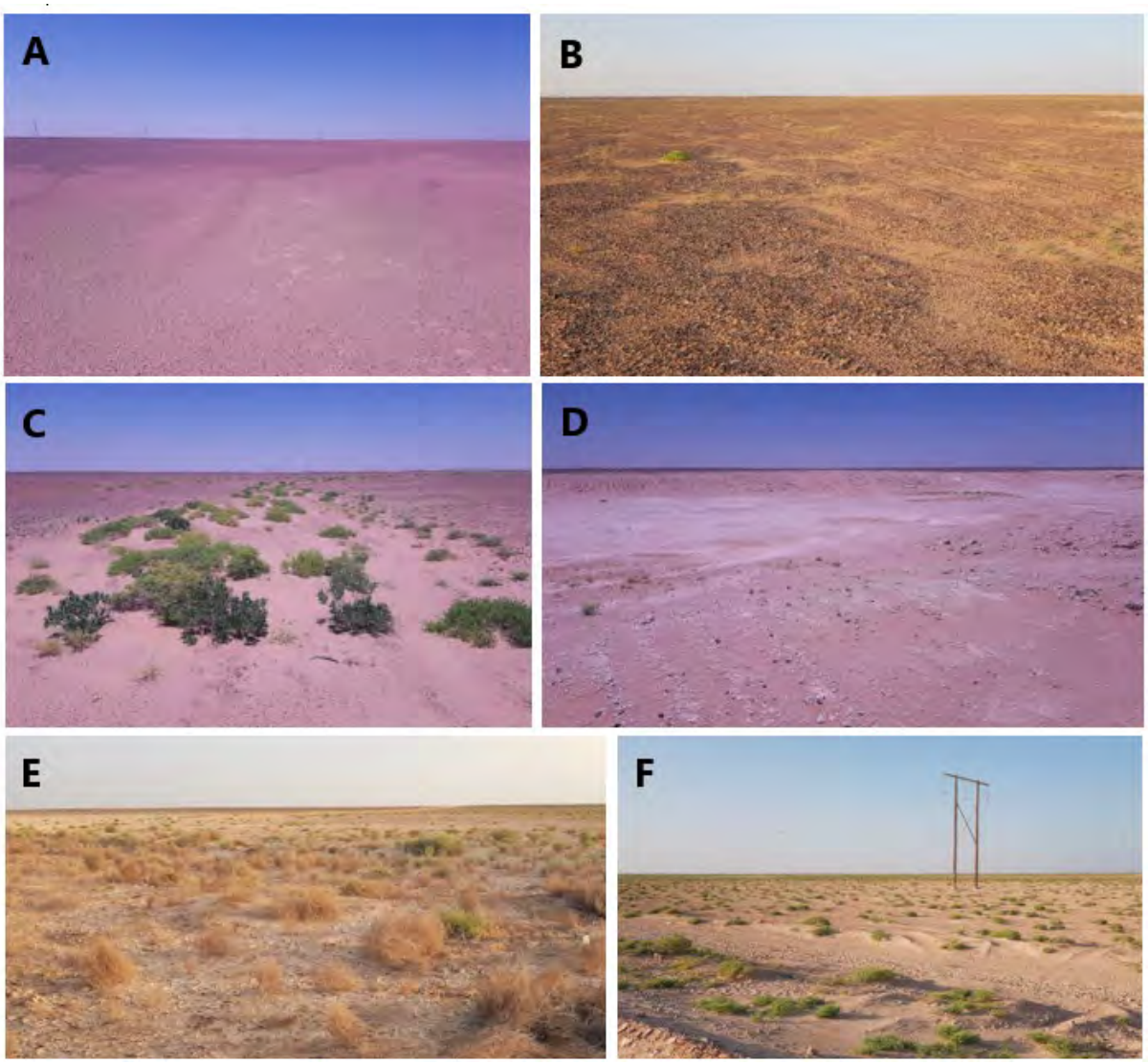
TABLE 6-11 HABITAT TYPES WITHIN THE TERRESTRIAL ECOLOGY AOI

Habitat Code (Brown & Boer, 2004)	Habitat types	Description
5120	Gravel plains with dwarf shrub vegetation	• Areas of substrate consisting of gravel, pebbles or rocky material supporting dwarf shrub (i.e. woody perennials less than 1 m high, and usually less than 50 cm) and sometimes shrub vegetation but few trees. • Plants: *Tetraena qatarense*, *Vachellia flava*, *Stipagrostis plumosa*. • Animals: Breeding birds can include Cream-coloured courser, Crowned Sandgrouse, Chestnut-bellied Sandgrouse, Crested Lark and Greater Hoopoe Lark • Other habitats generally associated with 5120: Gravel plains with distinct tree vegetation (5110), Gravel plains with sparse vegetation (5130) and wadis in open terrain (6320)
5130	Barren Gravel plains with sparse vegetation	• Areas of substrate consisting of gravel, pebbles or rocky material supporting very little vegetation. • Plants: *Tetraena qatarense* • Animals: Breeding birds include Cream-coloured courser, Chestnut-bellied Sandgrouse, Crested Lark. Elsewhere Greater Hoopoe-Lark can occur where there is both gravel plains and sand dunes. • Other habitats generally associated with 5130:, Gravel plains with dwarf shrub vegetation (5120) and wadis in open terrain (6320)
5200	Gravel hills with rocky outcrops	• Similar to 5130, Bare ground with no vegetation (due to its rocky nature or saline soils), although halophytes may occur where there is a thin carpeting of sand on the surface. • Plants: none • Animals: none • Other habitats generally associated with 5200: Gravel plains with distinct tree vegetation (5110), Gravel plains with dwarf shrub vegetation (5120), Gravel plains with sparse vegetation (5130) and wadis in open terrain (6320)
6320	Wadis and drainage channels in open terrain	• Broad wadis, together with associated terrain that is mostly sandy with gravel. Vegetation in wadis tends be have greater cover with a higher density of trees than the surrounding areas. • Plants: Trees and shrubs are often present, such as *Vachellia tortilis*, *V. flava*. Herbaceous species may be present after rain, and shrubs are often present, such as *Raziya stricta.* • Animals: Birds can include Southern Grey Shrike. • Other habitats generally associated with 6320 in the field: Gravel plains with distinct tree vegetation (5110), Gravel plains with dwarf shrub vegetation (5120), Gravel plains with sparse vegetation (5130)

Habitat Code (Brown & Boer, 2004)	Habitat types	Description
9400, 9500	Paved and unpaved Roads,	• This land use category includes paved (blacktop) and unpaved (compacted soil) roads
9600	Disturbed ground	• Areas grossly disturbed by human activity that cannot be considered as natural habitats including construction sites, borrow pits associated with road or well pad construction, and other areas affected by earthworks.
9210	Oil industry infrastructure	• Land developed for industrial use including gathering stations, power infrastructure, contractor camps oil well pads, and oil pipelines (flow lines).

Natural habitats in the AOI fall into four main categories: i) barren, sparsely vegetated gravel plain, which is the dominant habitat type, ii) gravel plains with dwarf shrubs, iii) drainage lines in open terrain, iv) disturbed ground (i.e., borrow pits). These four habitat types are illustrated in Figure 6.39. It should be noted that precisely delineating these habitats is an expert judgement because there is no clear attribute that allows one habitat to be distinguished from the other, particularly at small scales (i.e. a mapping resolution of tens of meters). Drainage lines do occur on site, but these are small and are not clearly mapped at the scale at which the habitat mapping was conducted (i.e. 5 km AOI).

FIGURE 6.39 DOMINANT HABITAT TYPES AT AND AROUND THE PROJECT SITE



A and B: barren gravel plains which characterise the site; C: shallow vegetated drainage channels. D: Disturbed ground (borrow pits); E and F: Gravel plains with dwarf shrub cover, onsite and offsite respectively.

Source: 5OES, 2024

The habitat types occurring on site are widespread in Oman's central deserts and are therefore not considered particularly unique in the national context. Following the first ecological survey on site in May 2024, the site and the surrounding areas do not appear to support communities of flora or faunal species of conservation interest and concern (see sections below for further details). One pair of Spotted Sandgrouse were observed displaying breeding behaviour,

indicating that this pair are breeding on site. The breeding season for sandgrouse in Oman is February to September, with timing and success influenced by factors such as rainfall.

The condition of habitats occurring on site and its vicinity has been affected by traditional land uses by oil and gas production activities. The Project site is currently undeveloped, although disturbance arising from aggregate extraction from borrow pits is evident. As such, terrestrial habitats have been degraded to some extent by overgrazing and earthworks.

Relevant to the ecology in the AOI is the presence of ephemeral surface water features. Heavy rain 15-17 April 2024 has ponded in the wadi system 1 – 1.5 km and 6.5 km to the SE of the project site where the road (with no culverts installed to maintain the natural flowline) has altered its hydrology. Evidently, this water body first appeared during the rainfall event, was still extensive four weeks later when the ecology survey was conducted (13 May), but ten days later had evaporated by 25 May, returning to its normal dry condition.

Camel tracks and signs were observed in May 2024. Since then camels have been observed at this site using camera traps, indicating that camels graze in the area and on site. These areas are also important for some bird species, including sandgrouse and ravens, as evidenced by tracks in mud at the water's edge. Foxes have also been observed at these sites in May and June, having been photographed on camera traps (see details presented later in this Chapter).

FIGURE 6.40 EPHEMERAL SURFACE WATER IN THE WADI BED 1.5 KM FROM THE PROJECT SITE

Source: 5OES, 2024

The sensitivity of habitats in the AOI is low due to their low diversity of flora and fauna (described later in this Chapter), their low level of uniqueness and their widespread distribution in central Oman. Ground nesting birds (one pair of Spotted Sandgrouse *Pterocles senegallus*) have been observed on site in May 2024, so the site has a small degree of sensitivity with respect to resident bird species.

6.2.4.4 CRITICAL HABITATS

A CHA has been prepared and is specifically intended to address the requirements of *IFC Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources* ("IFC PS6"). IFC PS6 requires that projects identify the presence and extent of ***modified, natural and/or critical habitat*** (as defined by the standard) in the Project's Area of Influence.

Appendix H presents the full report, which describes the CHA carried out by ERM/5OES including the approach, results and conclusions. The CHA is an integral part of the overall assessment of biodiversity impacts and risks of the Project.

Approach

The approach taken to identify prospective critical habitat features and assess impacts comprised the following:

- The Project's Area of Influence (AoI) for biological receptors was defined.
- An Area of Analysis (AoA) was defined, which included the Project's AoI and a geographic extent beyond (i.e. this study area encompasses the area affected by the Project's direct and indirect impacts - being the Area of Influence and the surrounding landscape). The boundaries of the AoA followed a standard 50 km buffer area around the project (using the IBAT analysis as required by PS6 as default), and verifying that the extent of natural areas as well as any protected area boundaries in the AOA.
- Biodiversity features within the AoA that could trigger classification as critical habitat were identified, along with the habitat types supporting them that occur in the AoI and where that habitat extended beyond it. Where candidates were identified, an Ecologically Appropriate Area of Analysis (EAAA) was defined. The population size of species and proportions of populations in those habitats were then estimated based on percentage of total species range, baseline survey results (if available) and expert judgement. The EAAA was used to confirm if their classification as critical habitat was triggered under IFC PS6 Criteria 1, 2, or 3 and areas/underlying ecological processes that met IFC Criteria 4-5 (these criteria are described below).
- Information on biodiversity features from the findings of the ESIA scoping and preliminary baseline studies were used to identify areas of modified and natural habitat in the AoI. Furthermore, scoping results were used to inform the ESIA baseline survey locations and species of interest. Findings are documented in this Chapter 6 of this ESIA.
- The impacts on natural and critical habitat and losses of each due to the Project are identified in the ESIA report (Chapter 7 of the ESIA), to which the CHA Report is appended (Appendix H), and summarized in the context of the natural and critical habitat features identified.

Definitions and Criteria

The CHA adopted the following definitions referenced in IFC PS6.

Natural and Modified Habitat

IFC PS6 defines natural habitats as:

"…areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition".

IFC PS6 defines modified habitats as:

"…areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition. Modified habitats may include areas managed for agriculture, forest plantations, reclaimed coastal zones, and reclaimed wetlands."

Critical Habitats

IFC PS6 states that critical habitats are those with high biodiversity value. The five criteria set out in IFC GN6 to identify critical habitat are as follows:

- Criterion 1: Critically endangered (CR) and/or endangered (EN) species.
- Criterion 2: Endemic and/or restricted-range species.
- Criterion 3: Migratory and/or congregatory species.
- Criterion 4: Highly threatened and/or unique ecosystems.
- Criterion 5: Key evolutionary processes.

Criteria 1 to 3 are focused at the species level, whilst Criteria 4 and 5 focus on ecosystem and landscape characteristics.

IFC GN6 Paragraphs 70 to 83 detail the determination of critical habitat based on relative vulnerability (degree of threat) and irreplaceability (rarity or uniqueness). For Criteria 1 to 4, quantitative thresholds are provided to assign critical habitat (Table 6-12). These thresholds rely on the availability of estimates of a species' global and local population determined either from published sources or obtainable by reasonable means through field assessment in the case of the local population. Should this type of information not be available for the species under consideration, IFC GN6 expects that expert opinion be used to determine the significance of the EAAA with respect to the global population. Surrogates of population size such as extent of occurrence, estimate of total area of known sites, estimates of area of occupied habitat, and others, can aid in this process.

IFC PS6 Criterion 5 applies to landscape-level features that can influence key evolutionary processes. Key landscape features such as unique topography or proximity to the coast that creates unique habitats and areas important for climate change adaptations have been identified using literature review and through expert consultation.

TABLE 6-12 CRITERIA DEFINITION AND THRESHOLDS FOR CRITICAL HABITAT DETERMINATION

Criteria	Threshold
Criterion 1 - Critically Endangered (CR) or Endangered (EN) Species Critically Endangered species face an extremely high risk of extinction in the wild. Endangered species face a very high risk of extinction in the wild.	(a) Areas that support globally important concentrations of an IUCN Red-listed EN or CR species (≥ 0.5% of the global population AND ≥ 5 reproductive units ([5]) of a CR or EN species). (b) Areas that support globally important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in GN72(a). (c) As appropriate, areas containing important concentrations of a nationally or regionally listed EN or CR species.
Criterion 2 - Endemic and Restricted-range Species For purposes of the GN6, the term endemic is defined as restricted-range. Restricted range refers to a limited extent of occurrence.	a) Areas that regularly hold ≥10% of the global population size AND ≥10 reproductive units of a species.
Criterion 3: Migratory and Congregatory Species Migratory species are defined as any species of which a significant proportion of its members cyclically and predictably move from one geographical area to another (including within the same ecosystem). Congregatory species are defined as species whose individuals gather in large groups on a cyclical or otherwise regular and/or predictable basis. Examples include the following: • Species that form colonies. • Species that form colonies for breeding purposes and/or where large numbers of individuals of a species gather at the same time for non-breeding purposes (for example, foraging and roosting). • Species that utilize a bottleneck site where significant numbers of individuals of a species occur in a concentrated period of time (for example, for migration). • Species with large but clumped distributions where a large number of individuals may be concentrated in a single or a few sites while the rest of the species is largely dispersed.	(a) Areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle. (b) Areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress.

(5) The IUCN Biodiversity Areas standard uses the following definition for reproductive unit: "the minimum number and combination of mature individuals necessary to trigger a successful reproductive event at a site Examples of five reproductive units include five pairs, five reproducing females in one harem, and five reproductive individuals of a plant species." Eisenberg, 1977. The Evolution of the Reproductive Unit in the Class Mammalia.

Criteria	Threshold
• Source populations where certain sites hold populations of species that make an inordinate contribution to recruitment of the species elsewhere (especially important for marine species).	
Criterion 4: Highly Threatened or Unique Ecosystems The IUCN is developing a Red List of Ecosystems, following an approach similar to the Red List for Threatened Species. The client should use the Red List of Ecosystems where formal IUCN assessments have been performed. Where formal IUCN assessments have not been performed, the client may use assessments using systematic methods at the national/regional level, carried out by governmental bodies, recognized academic institutions and/or other relevant qualified organizations (including internationally recognized NGOs).	a) Areas representing ≥5% of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN. b) Other areas not yet assessed by IUCN but determined to be of high priority for conservation by regional or national systematic conservation planning.
Criterion 5: Key Evolutionary Processes The structural attributes of a region, such as its topography, geology, soil, temperature, and vegetation, and combinations of these variables, can influence the evolutionary processes that give rise to regional configurations of species and ecological properties. In some cases, spatial features that are unique or idiosyncratic of the landscape have been associated with genetically unique populations or subpopulations of plant and animal species. Physical or spatial features have been described as surrogates or spatial catalysts for evolutionary and ecological processes, and such features are often associated with species diversification. Maintaining these key evolutionary processes inherent in a landscape as well as the resulting species (or subpopulations of species) has become a major focus of biodiversity conservation in recent decades, particularly the conservation of genetic diversity. By conserving species diversity within a landscape, the processes that drive speciation, as well as the genetic diversity within species, ensures the evolutionary flexibility in a system, which is especially important in a rapidly changing climate.	The significance of structural attributes in a landscape that may influence evolutionary processes will be determined on a case-by-case basis, and the determination of critical habitat will be heavily reliant on scientific knowledge. In the majority of cases, this criterion will apply in areas that have been previously investigated and that are already known or suspected to be associated with unique evolutionary processes. While systematic methods to measure and prioritize evolutionary processes in a landscape do exist, they are typically beyond a reasonable expectation of assessments conducted by the private sector.

Main Conclusions

The IBAT report for this project confirms that there are no protected areas, world heritage sites, key biodiversity areas or areas defined by the Alliance for Zero Extinction (AZE) within 50 km of the project site. Of the four species identified as priority species, all are birds:

- Egyptian Vulture, *Neophron percnopterus*

- Lappet-faced Vulture, *Torgos tracheliotos*
- Steppe Eagle, *Aquila nipalensis*, and
- Saker Falcon, *Falco cherrug*

The CHA screening study reviewed potential trigger species for critical habitats and found that none met the Criterion 1 thresholds. No restricted range species occur on site that meet Criterion 2 thresholds, and the site does not sustain significant populations of migratory/congregatory species meaning that Criterion 3 definitions are not met. All habitats on site are widespread in Oman, and therefore Criterion 4 requirements are not met, and no key evolutionary process occur on site or in the project's AOI. The screening study therefore concluded that no critical habitats are found on site.

See Appendix H for the Critical Habitat Assessment (CHA) screening report.

6.2.5 FLORA

6.2.5.1 VEGETATION IN THE WIDER AREA

The purpose of the vegetation mapping is to i) understand the value of grazing at the Project site in the context of the wider area, and ii) assist with the identification of bird attractants in the AOI.

Vegetated areas have been mapped for the Bird AOI (25 km) as presented in Figure 6.41. The map was developed as a composite of all high-quality Sentinel satellite imagery from January to December 2023 following calculation of Normalised Difference Vegetation Index (NDVI) to detect and highlight vegetation occurring in the AoI. The purpose of the vegetation mapping in the wider AOI is to i) understand the value of grazing at the Project site in its wider context, and ii) assist with the identification of bird attractants in the AoI.

The NDVI index ranges from -1 to +1, with no distinct boundary for each type of land cover. Negative NDVI values typically indicate the absence of vegetation mainly water or bare soil, values near zero indicating sparse vegetation, while values near +1 suggest the presence of dense and healthier vegetation. Other indices such as the Soil Adjusted Vegetation Index (SAVI), Enhanced Vegetation Index (EVI), and Atmospherically Resistant Vegetation Index (ARVI) need to be compared with the results of the NDVI results to improve accuracy of the final map. The steps followed in creating the map involved were:

1. **Vegetation Quantification:** NDVI quantifies vegetation by measuring the difference between near-infrared (which vegetation strongly reflects) and red light (which vegetation absorbs) reflectance values
2. **Data Calculation:** The Google Earth Engine cloud computing platform was used to calculate the time-series of NDVI from Sentinel 2 images
3. **Image Filtering:** A time filter is applied to include all images available in the year 2024 (2024/01/01 -2024/05/31). Additionally, an area mask was applied to define the area of interest.

4. **Cloud Cover Removal and NDVI Computation:** Images with cloud cover less than 10% are removed. NDVI is then computed for all the remaining images using the formula: (NIR - Red)/ (NIR + Red)
5. **Composite Creation:** Each NDVI was stacked into a single median composite on a per-pixel, per band basis.
6. **Comparison with Other Indices:** Other indices such as SAVI, EVI, and ARVI were calculated using their specific formulas and compared with each other.
7. **Final Map Preparation:** The final vegetation coverage map is prepared by categorizing high and low vegetation using the index values.

The output is therefore a comparative index of vegetation rather than providing absolute values. Since the method used a composite of all images, Figure 6.41 represents areas that may either contain permanent vegetation, temporary vegetation (e.g. grasses) following rain events, or both.

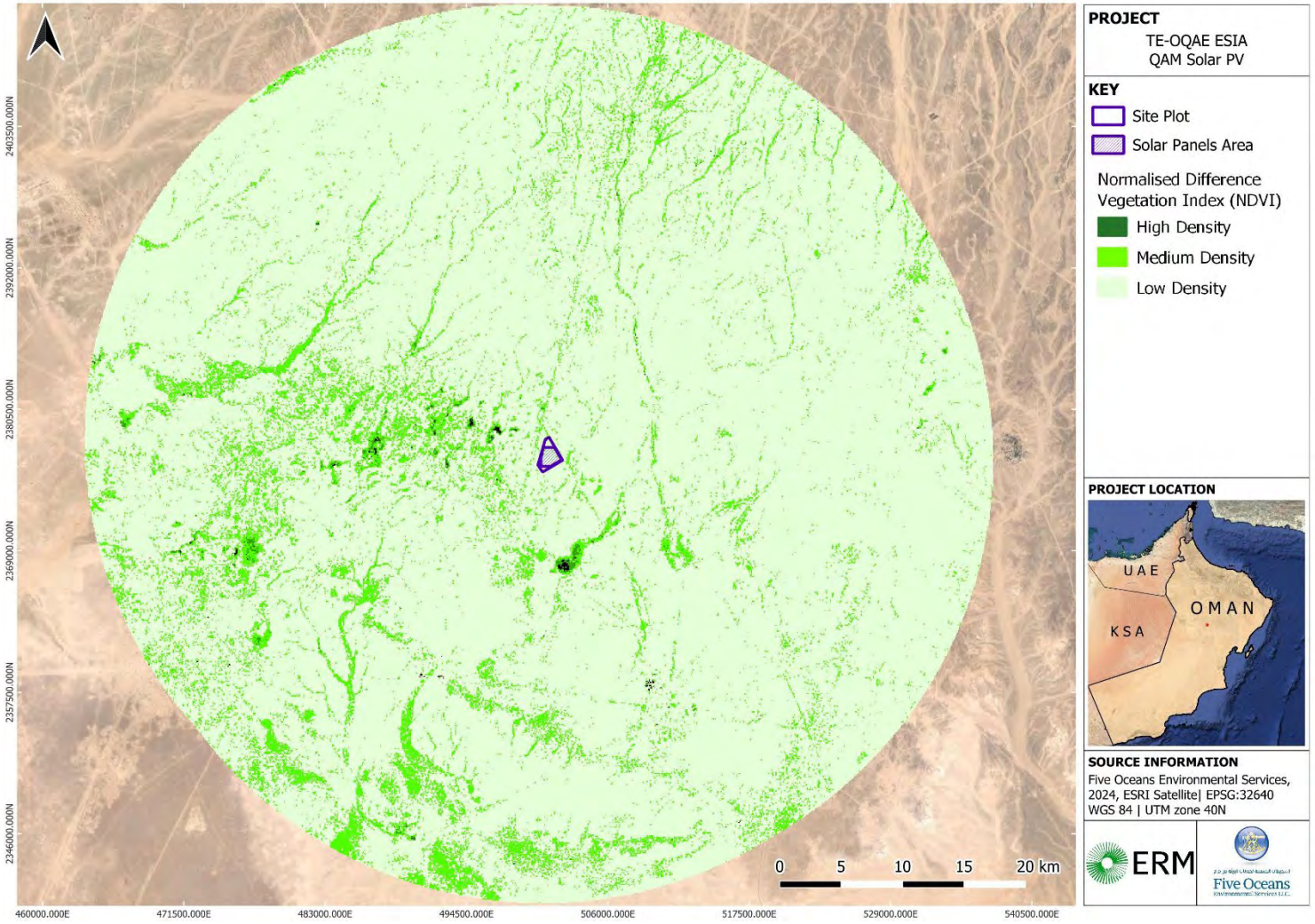
The results indicate that the value of the Project site with respect to grazing in the area is low, with only small patches of vegetation associated with the abandoned borrow pits. These accumulate wind-blown soil and may pond after heavy rain and thus provide better conditions for shrubs and grasses.

This analysis shows the presence of more vegetated areas in areas up to 25 km of the Project site (see Figure 6.40, and Figure 6.47 (panel D) which illustrate this point), with more extensive tree cover occurring in the wadis. Also noticeable in the vegetation mapping figure are shallow pans (*shiam*) in the otherwise flat gravel plain that flush with annuals (predominantly grasses) after rain. Such areas are valued for their grazing at these times. However, following heavy rain in 15 - 17 April 2024, areas of gravel plain with dwarf shrub cover and the wadi beds have flushed with grasses and other forage species which has provided good grazing for camels, and a tended group of 20-25 camels was observed a few (3-5 km) to the east of the project site. The rain and the associated increase in plant cover also triggered an emergence of desert locusts *Schistocerca gregaria*, which in turn provide prey for some bird species, notably Brown-necked Ravens *Corvus ruficollis* which were observed feeding on locusts in groups of up to 50 in areas identified in Figure 6.41 as having higher vegetation cover.

Dense vegetation at the PDO Qarn Alam camp was detected in the area, which reflects the soft irrigated landscaping that has developed over the past few decades. Other ecological features in the 25 km AoI may act as bird attractors, including topographic features, vegetated dune fields and wadi beds.

However, the vegetation cover on site is very low, with large expanses of barren gravel plain dominant or predominant, with the majority of the floral community being restricted to drainage channels, most of which are in the south of the plot. Habitats on site are therefore considered of low value, but do provide some value for camel grazing. The value of the site for camel grazing appears to be relatively low, with only small patches of suitable forage occurring onsite, particularly in the abandoned borrow pit on the site's western boundary. Observations and camera trapping data (see below) on site suggest that the numbers of camels using the site is low, but they visit the site relatively frequently.

FIGURE 6.41 VEGETATION MAPPING (USING NDVI) OF THE PROJECT AOI FOR AVIFAUNA (25 KM)

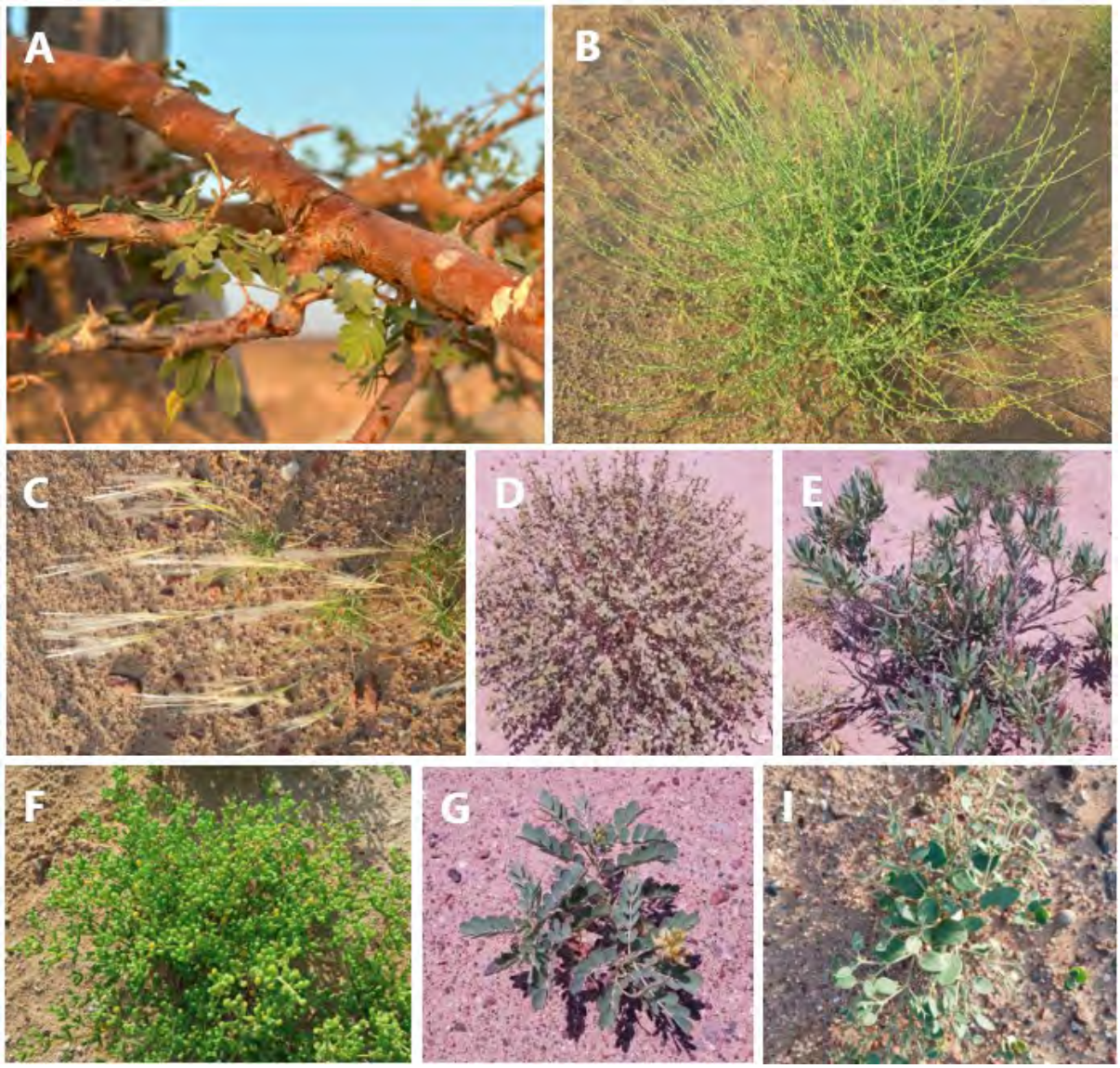


Source: ERM & 5OES, 2024

6.2.5.2 FLORAL COMMUNITY

The floral community observed on site is consistent with Ghazanfar's (2003) description of the dominant vegetation unit in Oman's central desert: *Vachellia* (*Acacia*) - *Tetraena* (*Zygophyllum*) *Heliotropium*. However, at the Project site no trees (bar one individual example of *Prosopis cineraria*) were observed, although *Vachellia sp.* and *Prosopis cineraria* were observed in wadi channels in surrounding areas.

FIGURE 6.42 SELECTION OF PLANTS OBSERVED ON OR NEAR THE PROJECT SITE



A: The only tree that occurs on site, Prosopis cineraria. B: Cleome pallida, a dwarf shrub observed on site. C: Stipagrostis sp., a common grass in central Oman and palatable for wildlife and livestock. D: Cleome droserifolia, a dwarf shrub with a wide distribution. E: Rhazya stricta found in isolated areas within drainage channels F: Tetraena qatarensis, a common halophyte and indication of saline soils G: Senna holosericea I: Zygophyllum indicum a halophytic dwarf shrubs observed on site.

Source: 5OES, 2024

Similarly, with respect to dwarf shrubs *Tetraena* sp and *Rhazya stricta* were both observed on site, with *Tetraena* dominating, while *Pulicaria glutinosa* has been observed in the vicinity of the project. Representative plants recorded on the Project site are illustrated in Figure 6.42. In

summary, the floral community is typical for gravel plain deserts in northern central Oman, and does not contain species of conservation concern.

A summary of the 19 plant species observed at the site, together with their International Union for Conservation of Nature (IUCN) conservation status is given in Table 6-13. No species found on site are listed in Oman's Plant Red List (Patzelt, 2014). Species determinations of plants have been provided by Dr Annette Patzelt, a recognised expert on Oman's flora, based on photographs of plants observed on site during site visits conducted on 13 and 17 May 2024.

TABLE 6-13 PLANT SPECIES RECORDED IN THE SOLAR FARM PROJECT AREA

No	Species Name	Distribution	IUCN Status
1	*Cleome droserifolia*	NE Africa, Arabia, Jordan and Syria	LC
2	*Cleome pallida*	NE Africa, Arabia, Jordan and Syria, Iran, Pakistan and India	LC
3	*Convolvulus prostratus*	Widespread across N Africa and Asia, with introductions into N America, S America, S Africa, Australasia	LC
4	*Crotalaria persica*	Horn of Africa and Eritrea, Arabia, Iran and Pakistan	NA
5	*Cyperus aucheri*	Algeria, Niger, Sudan, parts of Arabia, Iran, Afghanistan and Pakistan	NA
6	*Cyperus conglomeratus*	N Africa, Arabia, Iran, Afghanistan, Pakistan and India	LC
7	*Heliotropium bacciferum*	N Africa, Arabia, Iran, Afghanistan, Pakistan and India	LC
8	*Indigofera argentea*	Sahel, Arabia and Western Asia	LC
9	*Kohautia retrosa*	Arabia and Western Asia	LC
10	*Lasiurus scindicus*	N Africa, Arabia, Iran, Afghanistan, Pakistan and India	LC
11	*Monsonia heliotropioides*	N Africa, Arabia, Iran, Afghanistan, Pakistan and India	LC
12	*Prosopis cineraria*	Arabia, Iran, Afghanistan, Pakistan and India	LC
13	*Rhazya stricta*	Arabia, Iran, Afghanistan, Pakistan and India	LC
14	*Senna holosericea*	Central Africa (Chad), NE Africa, Arabia, Pakistan, India	NA
15	*Stipagrostis sokotrana*	Arabian Regional Endemic (KSA, Yemen, Oman, UAE, Qatar, Bahrain)	LC
16	*Tephrosia purpurea*	Widespread across Africa, Arabia and south Asia from Iran to China, Indonesia and Australia, and introduced to N and S America	LC
17	*Tribulus pentandrus*	N Africa, SW Africa, Arabia, Iran, Afghanistan, Pakistan and India	LC

No	Species Name	Distribution	IUCN Status
18	*Zygophyllum indicum*	N Africa, Arabia, Iran, Afghanistan, Pakistan and India	LC
19	*Zygophyllum qatarense*	Arabian Regional Endemic (KSA, Yemen, Oman, UAE, Qatar, Bahrain)	LC

IUCN Status

Source: https://www.iucnredlist.org and distributions from https://powo.science.kew.org Accessed June 2024.

6.2.5.3 FLORA OF CONSERVATION CONCERN

The key references that have been used for determining which species of vascular plants are of conservation concern are:

- The Oman Plant Red Data Book (Patzelt, 2014) is taken as the authority on plant species of conservation concern in Oman.
- IUCN Red List

Species of conservation concern are defined as those with vulnerable (VU), endangered (EN) or critically endangered (CR) species, and endemic species with restricted ranges (less than 50,000 km^2).

According to these sources, and as per communication with Dr Annette Patzelt, a leading expert on Oman's flora, none of the species observed on site are of conservation concern.

6.2.5.4 INVASIVE SPECIES

Patzelt et al. (2022) has analysed the alien flora of Oman and provides a list of 110 alien plant species, of which the most invasive is *Prosopis juliflora.* This species is therefore of concern because it poses a biological invasion risk. *P juliflora* is widespread on the coastal plains of Al Batinah and Dhofar, and occurs extensively throughout Oman, including at locations close to the project site such as a PDO Qarn Alam and on the road side near the site (4.5 km to the SE of the site), but has not been observed on site.

FIGURE 6.43 PROSOPIS JULIFLORA

Source: Wikipedia, accessed July 2024.

6.2.6 FAUNA

This section describes the findings of deskbased research and surveys conducted on site to identify mammalian, reptilian, bird and inverbrate species occurring in the AOI (5 km for mammals and reptiles, and 25 km for birds). Data and information has been collected through desktop review of the scientific literature, drive over surveys conducted in the respective AOIs, walk over surveys of the project site and camera trapping (details given below). This section is also informed by the IBAT report for the project (see Appendix H).

6.2.6.1 CAMERA TRAPPING RESULTS

The locations of the three camera traps are given in Table 6-14. These locations were selected to be in areas most likely to be attractive to wildlife and birds, such as the vegetated borrow bit on site (QACT2) and ephemeral (temporary) surface water features in vegetated wadis (QACT1, QACT3). Results are available for the 49 days of the camera trapping program. Traps were all set to photographic mode (as opposed to video mode), and serviced on each site visit to change batteries and download data. No major operating issues with the camera traps have been encountered during the program. Minor issues have been reported during monitoring:

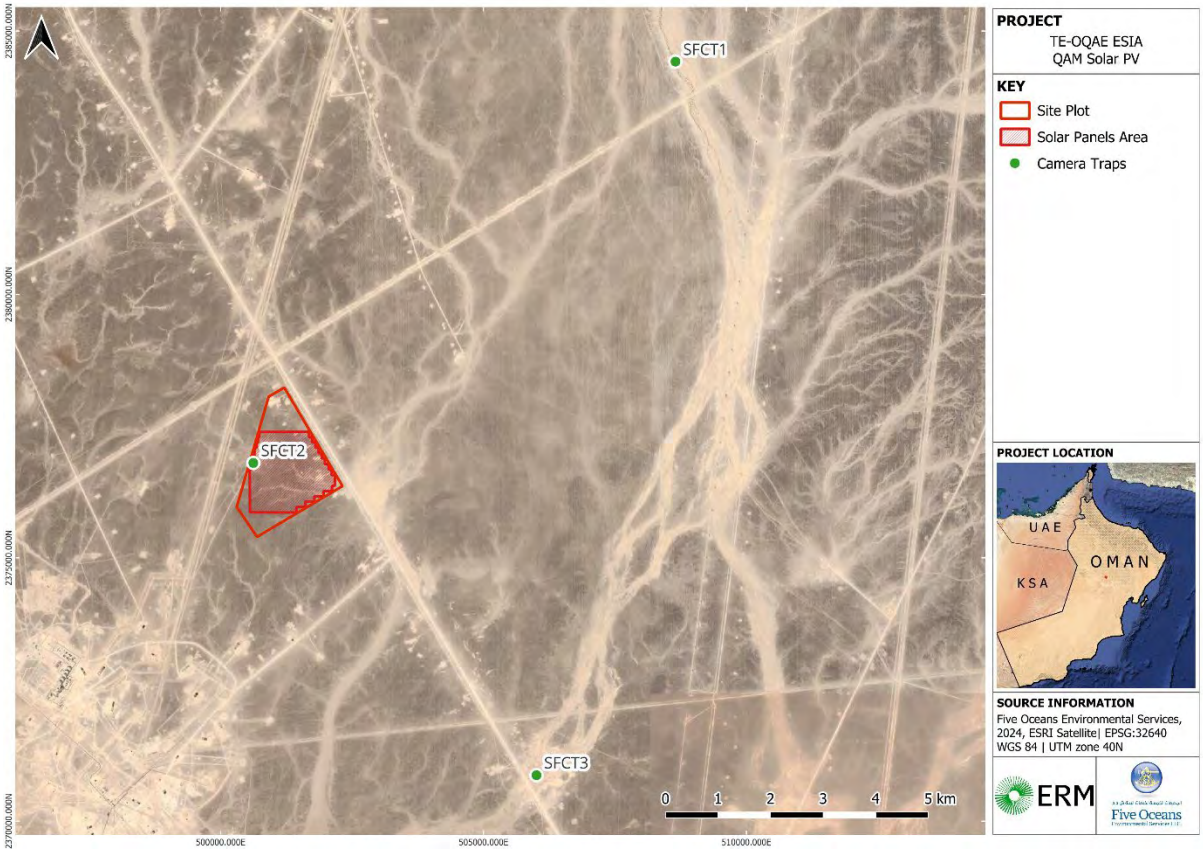
- QA CT1 was attached to somewhat mobile vegetation which triggered the camera repetitively on windy days.
- QA CT2 was disturbed by a camel which moved its field of view to a less suitable position.

TABLE 6-14 CAMERA TRAP SCHEDULE

Camera Trap	Coordinates	Location	Deployment Date (service date)	Duration of Monitoring to date
QA CT1	21°33'45.48"N 57° 5'0.84"E	Vegetated wadi, 9.6 km NE of the site	13 May 2024 (30 June 2024)	49 days
QA CT2	21°29'37.77"N 57° 0'21.84"E	Vegetated borrow pit on site	13 May 2024 (30 June 2024)	49 days
QA CT3	21°26'24.82"N 57° 3'28.71"E	overgrazed land near wadi, 6.5 km to the SE of the site	13 May 2024 (30 June 2024)	49 days

Source: 5OES, 2024

FIGURE 6.44 LOCATION OF CAMERA TRAPS DEPLOYED 13 MAY – 30 JUNE 2024



Source: 5OES, 2024

The results are given in Table 6-15 below, from which several general observations can be drawn. Only three bird species were captured by camera traps (Upcher's Warbler *Hippolais languida*, Black-crowned Sparrow Lark *Eremopterix nigriceps* and Brown-necked Raven *Corvus ruficollis*) and all of these have been previously observed during bird drive over surveys conducted in May 2024.

TABLE 6-15 CAMERA TRAP RESULTS

	Birds	Mammals	Reptiles
QA CT1	• None	• None	• None
QA CT2	• Upcher's Warbler (x2) 17 May • Black Crowned Sparrow Lark (x1) 24 May, (X1) 01 June • Brown Necked Raven (x1) 25 May	• Camels (x3) 25 May, (x4) 01 June, (x7) 02 June, (x3) 03 June, (x9) 04 June, (x2) 08 June, (x3) 17 June, (x2) 18 June, (x6) 19 June, (x4) 26 June	• None
QA CT3	• None	• Camels (x1) 25 May, (x4) 12 June, (x1) 13 June, (x1) 16 June, (x6) 17 June, (x3) 28 June • Arabian Red Fox (x1) 01 June, (x2) 02 June, (x1) 12 June, (x1) 16 June	• None

Camels are commonly found at the QA CT2 and QA CT3 sites; a total of 64 camels were observed during the camera trapping program, individual animals or small groups of two to nine animals on 16 days over the 49-day sampling period (33% of days). In terms of camel numbers, 43 of the 64 observations, around 67%, were made at QACT2 (vegetated borrow pit on site), indicating that this site is visited more often than the wadi area 6.5 km to the SE.

Arabian Red Foxes *Vulpes vulpes arabica*, not previously observed directly on-site during drive over surveys in May 2024, were recorded on four separate occasions at QACT3, with two foxes presumed to be a mother and cub recorded on one occasion. These encounter rates indicate that the fox population is low and these individuals probably scavenge over relatively large areas, as expected. However, the small numbers photographed by the camera traps was low, fewer than expected.

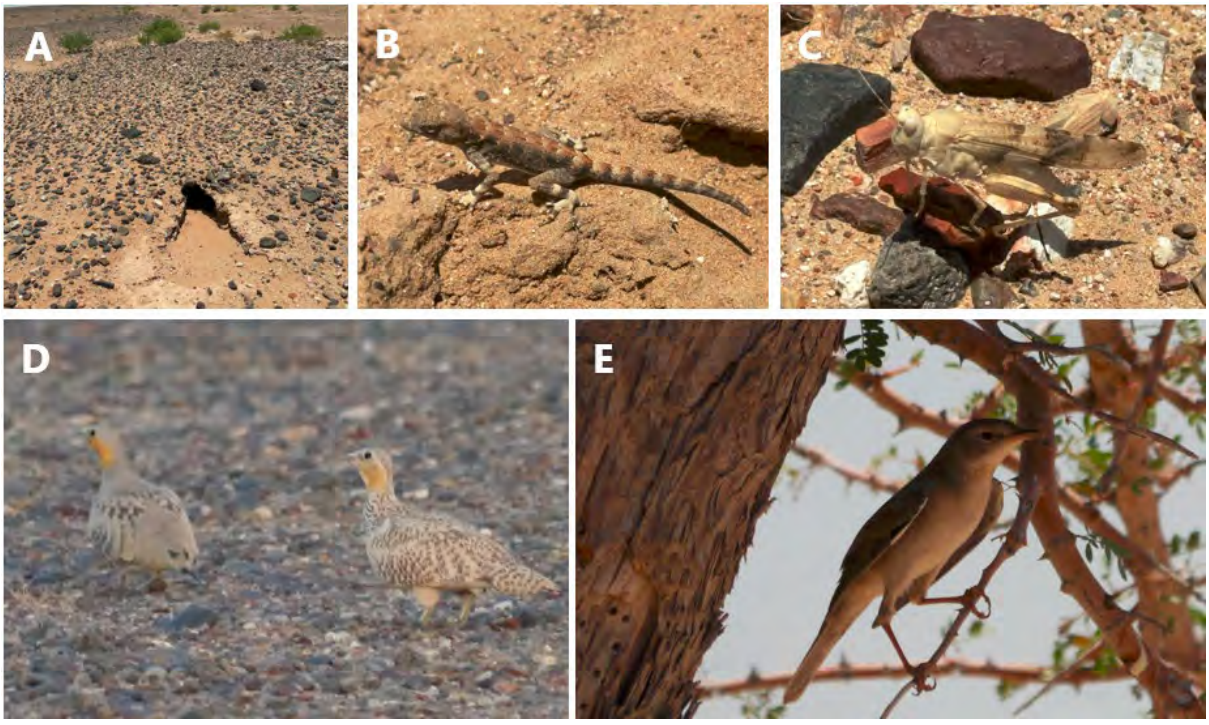
FIGURE 6.45 EXAMPLES OF PHOTOGRAPHS FROM CAMERA TRAPS 13 MAY – 30 JUNE 2024

Arabian Red Fox at QA CT3, vegetated wadi 6.5 km to the SE of the site in June 2024 (top left); Upchers

Warbler Hippolais languida at QA CT2, on site, in May 2024 (top right); A group of five camels at QA CT2 in June 2024 (bottom), at the vegetated borrow pit on site.
Source: 5OES, 2024.

The terrestrial fauna expected to occur in the AOI includes ungulates, reptiles and nocturnal small mammals typical of desert/semi-desert habitats. The species actually observed in the AOI and their IUCN status are presented in the following sections, with examples of observations made on site presented in Figure 6.46.

FIGURE 6.46 SELECTION OF FAUNA OBSERVED ON OR NEAR THE PROJECT SITE



A: Abandoned Red fox Vulpes vulpes arabica on site. B: Carter's Rock Gecko Pristurus carteri, an Arabian endemic species that is ubiquitous in natural habitats in Oman. C: Desert Locust Schistocerca gregaria, emerged after heavy rain 15 – 17 April 2024. D: A breeding pair of Spotted Sandgrouse, Pterocles senegallus; observed on site. E: Upcher's Warbler, Hippolais languida, observed on site May '24 and also caught on camera trap in June '24.

Source: 5OES, 2024

6.2.6.2 MAMMALS

Based on Fisher (1999), Table 6-16 shows potential mammal species, whose range includes the project AOI, and has been updated through consultation with Dr Andrew Spalton, co-author of the Field Guide to the Mammals of Oman (in prep), with respect to likelihood of occurance on site. This table shows the classification of the species according to IUCN (accessed on 2024), and the regional Red List assessment for Arabian mammalian carnivores.

While first production from the Qarn Alam oil field was in 1975, this field and the gas and condensate field of Saih A' Nihaydah (Discovery 1989: Phase 1: 2002 - 2005; Phase II: 2016 – 2018) have both been expanded and further developed since then, and local populations of the larger mammals, such as gazelle, are expected to have dwindled around that time as they were displaced from these areas. Table 6-16 also includes the classification of the species according to IUCN (accessed on 2024) as well as the regional Red List Assessment of carnivorous mammals (Mallon et al., 2011). Updated distributions since Fisher's (1999) work have been informed through engagement with Dr Andrew Spalton, an expert Arabian mammal ecologist, together with observations of wildlife made on site.

The large carnivore populations in Oman are generally highly fragmented and it is considered highly unlikely any occur in the AoI. It is possible that small feline carnivores such as the wildcat (*Felis silvestris*) may be present at the Project site, since these predate on small mammals. Alien rodent species, such as the black rat (*Rattus rattus*), and house mouse (*Mus musculus*), which have adapted to living in close association with humans, are not included in

Table 6-16 but may occur in vicinity of the project area associated with human activities and dwellings.

Arabian Fox (*Vulpes vulpes arabica*), Arabian Gazelle (*Gazella cora*), and Cape Hare (*Lepus capensis*) are the larger mammals that are most likely to occur on the Project site. An abandoned fox burrow was observed on site in May 2024, and prints of an adult and juvenile fox were observed in mud in the wadi systems 1.5 km and 6.5 km from the project site. A camera trap was set at this location which photographed Arabian Red Foxes on four occasions in June 2024.

As well as evidence of Arabian Red Fox on and near the site, small mammal burrows were noted during the scoping site visit in November 2023 and again during the ecology field survey conducted in May 2024. Signs and tracks of small mammals indicate that of the species listed in Table 6-16 jerboas, mice and gerbils are likely to be present on site, albeit in low densities and restricted to the more vegetated areas such as drainage lines.

Signs of camels were also evident on site, including recent footprints, droppings and bones, and camera trapping evidence suggests that camels are indeed present on site frequently (10 days of the 49-day camera trapping effort, around 20% of the time).

TABLE 6-16 CHECK LIST OF MAMMALS WHOSE RANGE INCLUDES THE PROJECT SITE AND SURROUNDING AOI

Name	Distribution	IUCN Red List Status (*) (Regional Red List**)	Oman Status and Habitat Preference
Arabian Gazelle, *Gazella cora*	Arabian sub-species of the gazelle (found in KSA, Yemen, UAE, and Oman)	VU	The population in the 1990's was estimated at 13,000, but has been declining due to poaching and habitat fragmentation. Prefers open desert habitat, including coastal influenced gravel plains with scattered trees. Suitable habitat occurs on site.
Arabian Red Fox *Vulpes vulpes arabica*	Arabian sub-species of the Red Fox (found in KSA, Yemen, Qatar, UAE, and Oman)	LC (LC)	Widespread in all areas of Oman, least concern (LC) regionally. Observed 6.5 km SE of the site, with signs detected 1.5 km SE of site. Habitat preference is flexible, and this species occurs in many habitat types from mountains, to wadis, to open desert plains. Suitable habitat occurs on site.
Arabian Wild Cat *Felis silvestris lybica*	Arabian sub-species of the Wild Cat (found in KSA, UAE, Oman)	LC (NT)	Present in N Oman and Dhofar. Habitat preference is flexible, and this species occurs in many habitat types from mountains, to wadis, to open desert plains and sandy plains. Suitable habitat occurs on site.
Ethiopian Hedgehog *Paraechinus aethiopicus*	Arabia, coastal strip of N Africa	LC	Regional status: near threatened (NT). Prefers open desert habitat, including gravel plains with dwarf shrub cover and scattered trees. Suitable habitat occurs on site.

Name	Distribution	IUCN Red List Status (*) (Regional Red List**)	Oman Status and Habitat Preference
Cape Hare, *Lepus capensis*	N Africa and Sahel, Southern Africa, East Africa, parts of Arabia, Iran, Pakistan and Nepal	LC	Widespread. Prefers open desert habitat, including gravel plains with dwarf shrub cover and scattered trees. Suitable habitat occurs on site.
Cheeseman's Gerbil, *Gerbillus cheesmani*	Arabia, from Syria to Kuwait (not present in NE KSA or Yemeni Mountains)	LC	Widespread Habitat preference is for desert plains having wind-blown sand that accumulates in *nabkha.* Suitable habitat occurs on site.
Sundevall's Jird *Meriones crassus*	North Africa, Arabia, Iran, Iraq, Turkey, Afghanistan, Pakistan	LC	Widespread Habitat preference is for desert plains having wind-blown sand that accumulates in nabkha. Suitable habitat occurs on site.
Lesser Jerboa *Jaculus jaculus*	N Africa and Arabia	LC	Widespread Habitat preference is for desert plains having wind-blown sand that accumulates in nabkha. Suitable habitat occurs on site.
Arabian Spiny Mouse *Acomys dimidiatus*	Sinai, coastal areas of KSA, Yemen, Oman and northern Emirates, and Iran	LC	Widespread Habitat preference is flexible and includes mountain areas and desert plains with rocky outcrops and crevices. Suitable habitat occurs on site.

**IUCN Status: Vulnerable (VU), Least Concern (LC), Near Threatened (NT)*
*** Regional carnivorous mammals (Mallon et al, 2011)*

Source of distribution information: Fisher (1999), Spalton (pers comm.).

Mammals of Conservation Concern

The key references that have been used for determining which mammal species are of conservation concern are:

- IUCN Red List
- Mallon, D. and Budd, K. (eds). (2011). Regional Red List Status of Carnivores in the Arabian Peninsula. Cambridge, UK and Gland Switzerland: IUCN, and Sharjah, UAE: Environment and Protected Areas Authority vi+49pp
- Royal Decree 114/2001 (Appendix 1 and 2)
- IBAT Report for Northern Oman Solar Farm Project (2024)

Species of conservation concern are defined as those that are i) listed as VU, EN and CR in the IUCN Red List (https://www.iucnredlist.org), ii) restricted range endemic species, iii) meet both of these criteria. All species of mammal except domesticated species are referred to in the appendices of RD114/2001.

No mammal species of conservation concern are listed in the project specific IBAT report, nor observed at the Project site.

Given that all mammalian wildlife species in Oman come under the protection of Royal Decree 114/2001, the only such species to have been observed in the AOI, the Arabian Red Fox, is considered to be a species of conservation concern.

6.2.6.3 HERPETOFAUNA

To assist in the identification of potential species that may occur on site but which have not yet been observed, an annotated check list of herptiles (based on Carranza's et al. (2021) Field Guide to the Reptiles of Oman) whose range overlaps with the project's terrestrial ecology AOI is given in Table 6-17. IUCN Status has been determined with reference to the global Red Data list, as there is no regional or national Red Data list for reptiles. Habitat preferences have been taken from Carranza et al. (2021). Species that occur only in sandy habitats (e.g., Arabian Horned Viper *Cerastes gasperettii gasperettii*) have been removed from the checklist because their preferred habitat is not found on site or in the area.

TABLE 6-17 CHECK LIST OF HERPTILES WHOSE RANGE OVERLAP WITH THE PROJECT SITE AND SURROUNDING AOI

Common Name	Species Name	IUCN Red List Status *	Regional Red List Status **	Notes
Wadi Racer	*Platyceps rhodorachis*	LC	LC	Horn of Africa, Arabia, Western Asia (Iran, Afghanistan, Pakistan). Occurs in diverse habitats from sea level to elevation of 2600 m. Suitable habitat occurs on site.
Crown Leaf-nosed Snake	*Lytorhynchus diadema*	LC	LC	Distribution North Africa and Arabia. It prefers sandy deserts and coastal dune areas but also occurs in sandy areas with rocky substrate. Suitable habitat may occur on site.
Hooded Malpolon	*Malpolon moilensis*	LC	LC	False cobra, occasionally predated by Southern Grey Shrike. Found in all habitats in Oman except sandy deserts. Suitable habitats are present on site.
Afro-Asian Sandsnake	*Psammophis schokari schokari*	LC	LC	Coastal parts of north Africa, Arabia and west Asia. Found in different habitats including wadis, arid sandy areas and gravel plains. Suitable habitat occurs on site.
Clifford's Diadem Snake	*Spalerosophis diadema cliffordi*	LC	LC	Found throughout Arabia, north Africa and west Asia and into Russia. Found in a diversity of habitat types, including gravel plains with vegetation. Suitable habitat occurs on site.
Northeast African Carpet Viper Complex	*Echis spp.*	LC	LC	NE Africa and Arabia. Widespread species found in gravel plains with vegetation. Suitable habitat occurs on site.
Yellow-spotted Agama	*Trapelus flavimaculatus*	LC	LC	Arabian endemic species (KSA, Oman, UAE, Qatar and Yemen). Occurs in sandy and gravel desert plains with vegetation. Suitable habitat occurs on site.
Spotted-toad Headed Agama	*Phrynocephalus maculatus*	LC	LC	Arabia and Iran, Iraq, Turkmenistan, Afghanistan and Pakistan. Prefers sandy substrates including dune areas. Limited suitable habitat occurs on site.
Carter's Semaphore Gecko	*Pristurus carteri*	LC	LC	Arabian regional endemic with widespread distribution in Arabia, occurring in a diversity of habitat types including gravel plains. Suitable habitats occur on site where it has been observed

Common Name	Species Name	IUCN Red List Status *	Regional Red List Status **	Notes
Desert Monitor Lizard	*Varanus griseus*	LC	LC	North Africa, Arabia, Turkey, Syria, Iraq, Iran. Found in a variety of habitats including wadis, sandy and gravel desert with some vegetation. Suitable habitat occurs on site.
Egyptian small scaled Spiny-tailed Lizard	*Uromastyx aegyptia microlepis*	VU	VU A2abcd+4abcd	NE Africa, and Arabia, Iran and Iraq. Prefers gravel plains with vegetation and is widely distributed in Oman. Suitable habitat occurs on site.
Dhofar Toad	*Firouzophrynus dhufarensis*	LC	-	Arabian endemic species ranging from Musandam on the Gulf of Oman to Jeddah on the Red Sea, within. Habitat preference is for shrublands, inland wetlands (natural and artificial). No suitable habitat occurs on site.

**IUCN Status : Vulnerable (VU), Least Concern (LC), Endangered (EN).* Source: 5OES, 2024
** *Cox et al., 2012*

Source: 5OES, 2024

Only one species of lizard has been observed on site to date: Carter's Rock Gecko, *Pristurus carteri*, an Arabian endemic with a wide distribution in Arabia (more than 1 M km^2). This species is ubiquitous in natural habitats in Oman and is listed by IUCN as being of least concern.

Herpetofauna of Conservation Concern

The key references for determining which species of herptiles are of conservation concern are:

- The Field Guide to the Reptiles of Oman (Carranza et al., 2021) is taken as an authority on reptile species and their conservation status in Oman
- IUCN Red List

Species of conservation concern are defined as those that are i) listed as VU, EN and CR in the IUCN Red List (https://www.iucnredlist.org), ii) restricted range endemic species, iii) meet both of these criteria. No reptiles are listed in the Appendices of RD114/2001.

To date no species of reptile or amphibian of conservation concern have been observed in the applicable AOI.

6.2.6.4 BIRDS

A total of 531 bird species are known to occur in Oman (Eriksen, 2020), which include 26 globally threatened species (Listed as either Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) on the global IUCN Red List). Reference is also made to the regional Red List of Arabian Breeding Birds (Symes et al 2015). The Project site itself is not considered to be particularly high value habitat for most bird species due to low plant cover, the lack of unique ecological features and the absence of surface water other temporary ponding in the nearby

(1.5 km to the SE) wadi system. However, there are waterbird attractants in the AoI (e.g., the extensive RO evaporation ponds 20 km to the SW of the Project) to attract migratory birds that may then pass through the Project site during their migration in September – November (southward) and March – April (northward).

Utility-scale solar PV facilities are potential sources of wetland bird mortality (Horváth et al., 2009), which is referred to as the 'lake effect hypothesis'. Research is ongoing into the causes and significance of this phenomenon and the leading hypothesis is that large fields of photovoltaic panels reflect polarised light in a similar way to large bodies of water, and these are mistaken by water birds which collide with panels, causing injury or mortality. There is still limited evidence to support this (Kosciuch et al, 2021) indicating that this may be a nuanced effect (Diehl et al., 2024), and it remains an area of active research in US and Europe.

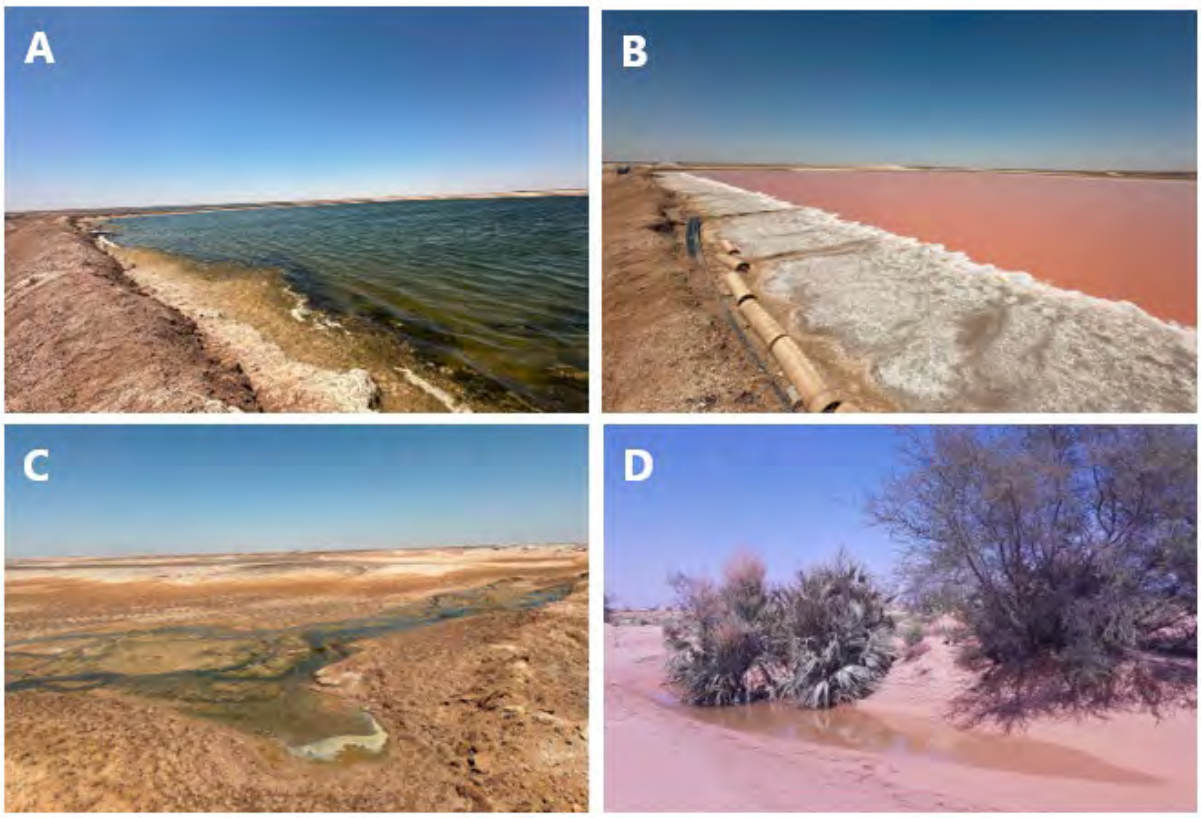
Bird Attractors in the AoI

The Project falls within the African-Eurasian Flyway, one of the four global migratory flyway routes. The African-Eurasian Flyway connects Africa, Europe and Asia and includes three major routes from the Artic to Southern Africa (BirdLife International, 2024). Migratory birds are anticipated to potentially occur around the Project site, at attractor sites in the AoI and the Jiddat Al Harasis Important Bird and Biodiversity Area (IBA). It is therefore expected that bird communities at the Project site and in the surrounding area will be influenced by bird migrations, and more seasonal bird surveys observations are planned to determine the bird community in key seasons.

There are six RO evaporation ponds within the 25 km AOI for birds (see Figure 6.47). These receive reject brine from the desalination of brackish groundwater that produces fresh water for PDO operations in the area. These evaporation ponds contain water of varying salinities, from brackish to hypersaline, with the most saline ponds forming solid salt deposits at their edges. These vary in size from around 1 ha to 16.9 ha, and have a combined area of 41 ha. Some of these locations were visited on 17 May 2024 and the least saline of the ponds had a green colour, with algal mat accumulating in the downwind corner and bacterial froth forming at the edges, indicating these supported simple primary production and decomposition food webs on which a few individual water birds were feeding. A water sample from the effluent outflow from one facility (see Figure 6.24 for location) has been analysed, and results are summarised in Section 6.1.8.3. This water has a high TDS concentration, with the major ions indicating sodium chloride and calcium sulphate. The moderate concentration of nitrate and potassium contribute to the phytoplankton and cyanobacterial blooms.

These water bodies attracted migratory species such as Greater Flamingo, *Phoenicopterus roseus* and the breeding resident species Black-winged Stilt, *Himantopus himantopus* and Kentish Plover *Charadrius alexandrinus*, as observed in May 2024. The list of all four species is given in Table 6-18.

FIGURE 6.47 SURFACE WATER FEATURES IN THE BIRD AOI (25 KM) OF THE PROJECT



A: RO evaporation pond containing reject brine and signs of phytoplankton and bacterial growth (13 km to SW of site). B: Hyper-saline RO evaporation pond, with salt precipitation at the pond edge. Pink colouration in the water is caused by cyanobacteria that are able to withstand highly saline conditions (13 km to SW of site). C: Discharge to the environment from RO evaporation pond which flows continuously and which forms a small wetland that may act as a bird attractor in the winter migration season (13 km to SW of site). A surface water sample was collected from this location and analysed (see Section 6.1.7). D: Temporary ponding in natural wadi system (9.5 km NE of site) following rain 15-17 April 2024, and the location of QACT1 camera trap.

Source: 5OES, 2024

Other smaller scale attractors include any surface water features, such as temporary ponding in wadis after rain and water tanker filling stations. The list of wetland birds that were observed at some of the RO evaporation ponds features in the AoI of the Project is provided in Table 6-18.

TABLE 6-18 WETLAND BIRD SPECIES OBSERVED AT SURFACE WATER FEATURES IN THE AOI (25 KM) OF THE PROJECT SITE (13 MAY 2024)

Common Name	Scientific Name	IUCN Conservation Status (LC: Least concerned)	Comments
Greater Flamingo	*Phoenicopterus roseus*	LC	Migrant
Black-winged Stilt	*Himantopus himantopus*	LC	Breeding resident
Kentish Plover	*Charadrius alexandrinus*	LC	Breeding resident
Common Sandpiper	*Actitis hypoleucos*	LC	Passage migrant and winter visitor

Source: 5OES, 2024

It is expected that the abundance and diversity of resident species on site will remain low throughout the year. However, the presence of water bodies is expected to attract migrating water birds in the migration periods (September - November and February - May) and these species may pass through the project site on their way to stopover points along their migratory route. The direction of the migration in Autumn is in a southerly direction, and during the Srping migration season it is generally northward. Since the central deserts are relatively flat and homogenous without significant topographical features, the migration occurs over a broad front and is not focused along well-defined routes.

Birds at the Project Site

During the drive over ecology surveys conducted in May 2024, a total of nine bird species were recorded (Table 6-19). All species observed were of Least Concern (LC) on the IUCN Red List, meaning that they are categorised as not being a focus of wildlife conservation because they are still plentiful in the wild, and do not qualify as threatened, or near threatened. During the site survey in May 2024, a breeding species, the Spotted Sandgrouse (*Pterocles senegallus*), was observed on site represented by single pair showed typical breeding behaviour.

TABLE 6-19 BIRDS OBSERVED ON OR NEAR THE PROJECT SITE

Common Name	Scientific Name	IUCN Conservation Status (Regional Status*)	Comments
Spotted Sandgrouse	*Pterocles senegallus*	LC (LC)	Probably breeding locally. Observed on site. Preference for gravel desert plains with vegetation within 50 km of surface water bodies. Suitable habitat occurs on site.
Southern Grey Shrike	*Lanius meridionalis*	LC (LC)	Breeding resident in Oman. Preference for vegetated wadis adjacent to desert areas. Suitable habitat

Common Name	Scientific Name	IUCN Conservation Status (Regional Status*)	Comments
			does not occur on site but this species may forage on site.
Brown-necked Raven	*Corvus ruficollis*	LC (LC)	Breeding locally. Commonly found in gravel plains, wadis, mountain area. This species nests in trees or artificial structures. Suitable habitat occurs on site. Observed on site and on camera traps.
Eurasian Collared Dove	*Streptopelia decaocto*	LC (LC)	Breeding resident in Oman. Found in a wide range of habitats including gravel plains, wadis, mountain area and urban areas. Suitable foraging habitat occurs on site.
Greater Short-toed Lark	*Calandrella brachydactyla*	LC (LC)	Common passage migrant. Habitat preference is for gravel plains with vegetation. Suitable habitat occurs on site.
Crested Lark	*Galerida cristata*	LC (LC)	Breeding resident in Oman. Habitat preference is for gravel plains with vegetation. Suitable habitat occurs on site. Observed on site.
Black-crowned Sparrow- Lark	*Eremopterix nigriceps*	LC (LC)	Breeding resident in Oman. Habitat preference is for gravel plains with vegetation. Suitable habitat occurs on site. Observed on site on camera traps.
Common Whitethroat	*Curruca communis*	LC (LC)	Common passage migrant. Observed in gravel plains with vegetation during migration seasons. Observed on site.
Upcher's Warbler	*Hippolais languida*	LC (LC)	Passage migrant in Oman. Observed in gravel plains with vegetation during migration seasons. Observed on site.
House Sparrow	*Passer domesticus*	LC (LC)	Breeding resident in Oman. Found in a wide range of

Common Name	Scientific Name	IUCN Conservation Status (Regional Status*)	Comments
			habitats including gravel plains, wadis, mountain area and urban areas.

*Symes et al 2015

Source: 5OES, 2024

One breeding pair of Spotted Sandgrouse were observed on site in May 2024. This species nests on the ground from February – September, with breeding coinciding with favourable conditions, such as rain. The site therefore has a small degree of sensitivity with respect to resident bird species, but is otherwise of low value to the bird community in the AOI.

Birds of Conservation Concern

The key references for determining which species of birds are of conservation concern are:

- IUCN Red List
- Royal Decree 114/2001 (Appendix 1 and 2)

Species of conservation concern are defined as those that are i) listed as VU, EN and CR in the IUCN Red List (https://www.iucnredlist.org), ii) restricted range endemic species, iii) meet both of these criteria. One species of bird is listed in Appendix 1 of RD114/2001 (Houbara Bustard) and Appendix 2 includes all species of falcon, owl, vulture, eagle, flamingo, pelican, gull and tern. Of the four species identified as priority species in the IBAT, all are birds:

- Egyptian Vulture, *Neophron percnopterus*
- Lappet-faced Vulture, *Torgos tracheliotos*
- Steppe Eagle, *Aquila nipalensis*, and
- Saker Falcon, *Falco cherrug*

To date no species of bird of conservation concern have been observed at the Project site. The species listed above may very occasionally be observed at the site, most likely transiting over the site at soaring altitude while foraging or migrating rather than on the ground or at low altitude. The Saker Falcon's behaviour is similar to other falcons, e.g. perching on trees or structures (e.g., telegraph poles) while resting or searching for prey, and aerially hunting, and may occur very occasionally at the site or in the bird AOI (25 km). The screening CHA study, (Appendix B) for more details relating to birds of conservation concern. The Greater Flamingo *Phoenicopterus roseus,* has been recorded in a groundwater reservoir in the Bird AOI (25 km), which is listed in Appendix II of RD 114/2001.

6.2.6.5 INVERTEBRATES

A number of insects were noted on site in low numbers by 5OES in May 2024 Survey, reflecting the generally sparce vegetation cover on which lower groups in the food chain depend. Occasional ants were noted, at a density that would be expected in these habitat types. Most species of desert ant are gramnivores, i.e. seed eaters, and therefore depend on seed production from plants as a source of food, and they compete for food with small mammals, which also include seeds as a major element in their diet. Ants are important to

desert ecosystems as they are typically prey for lizards and some birds, which in turn are preyed upon by predatory birds, foxes.

Rain falling 15 – 17 April 2024 had evidently triggered germination of dormant seeds resulting in a flush of young vegetation including grasses, forbs and shrubs. The same rainfall event probably triggered the emergence of desert locusts (*Schistocerca gregaria*), which were observed on site at young adult stage (i.e., post instar, which can be reached in 4 weeks after eggs hatch in favourable conditions). Locusts were observed being predated by Brown-necked Ravens, and no doubt will be fed upon by other insectivorous birds (e.g., shrikes).

Other incidental observations of insects were made during the ecological site survey on 13 and 17 May 2024, including:

- Common ground mantis (*Eremiaphila braueri*)
- Dragonfly (unidentified species)
- Individuals of three species of butterfly (*Colotis sp*., and two other unidentified species)

The site was unremarkable in terms of the insect fauna it supports, with low abundance and low diversity. Insects are not considered further in the impact assessment, as they are not a group of any particular conservation concern. Loss of habitat is considered insignificant given the available area of similar habitat in the surrounding areas.

6.3 SOCIOECONOMICS

6.3.1 INTRODUCTION

This section describes the baseline socioeconomic and health conditions relevant to the Project based on a combination of desktop and primary information collected during the field survey engagement activities conducted in in July 2024.

6.3.2 SOCIAL AREA OF INFLUENCE

The Project social Area of Influence (AoI) includes the Project site, with an area of around 300 ha., and the surrounding area where potential direct impacts are expected to occur. The social AoI has been defined to include a 15 km radius around the North Oman Solar PV Project site, with a primary focus on settlements that are potentially to be more directly affected by the development.

The North Oman Solar PV AoI lies in the Ad Dakhiliyah Governorate, specifically in the Wilayat of Adam. Abu Thaylah, located 14.9 km away from the Project site, is the only actively inhabited settlement within the AoI and is not related to oil and gas activities. This is a small settlement of around 14 houses (known as 'Shabbiyah housing' which are provided by the Ministry of Housing and Urban Planning) and around nine agricultural compounds

Table 6-20 shows the administrative jurisdiction of Abu Thaylah, and its distances to the Project site.

TABLE 6-20 SETTLEMENTS WITHIN THE NORTH OMAN SOLAR AOI AND DISTANCE TO PROJECT SITE

Governorate	Wilayat	Settlement	Distance to Project site (km)
Ad Dakhiliyah	Adam	Abu Thaylah	14.9

Within the Project's social AoI, another significant category of human receptors is the accommodation camps that support PDO operations in the area. These camps, which house both PDO staff and contractors working on PDO projects, are referred to as 'camps' here. They include accommodation units, mess halls with catering facilities, site offices, and a clinic. While most of the workforce is present during the evening and night, a small number of staff are on-site throughout the day.

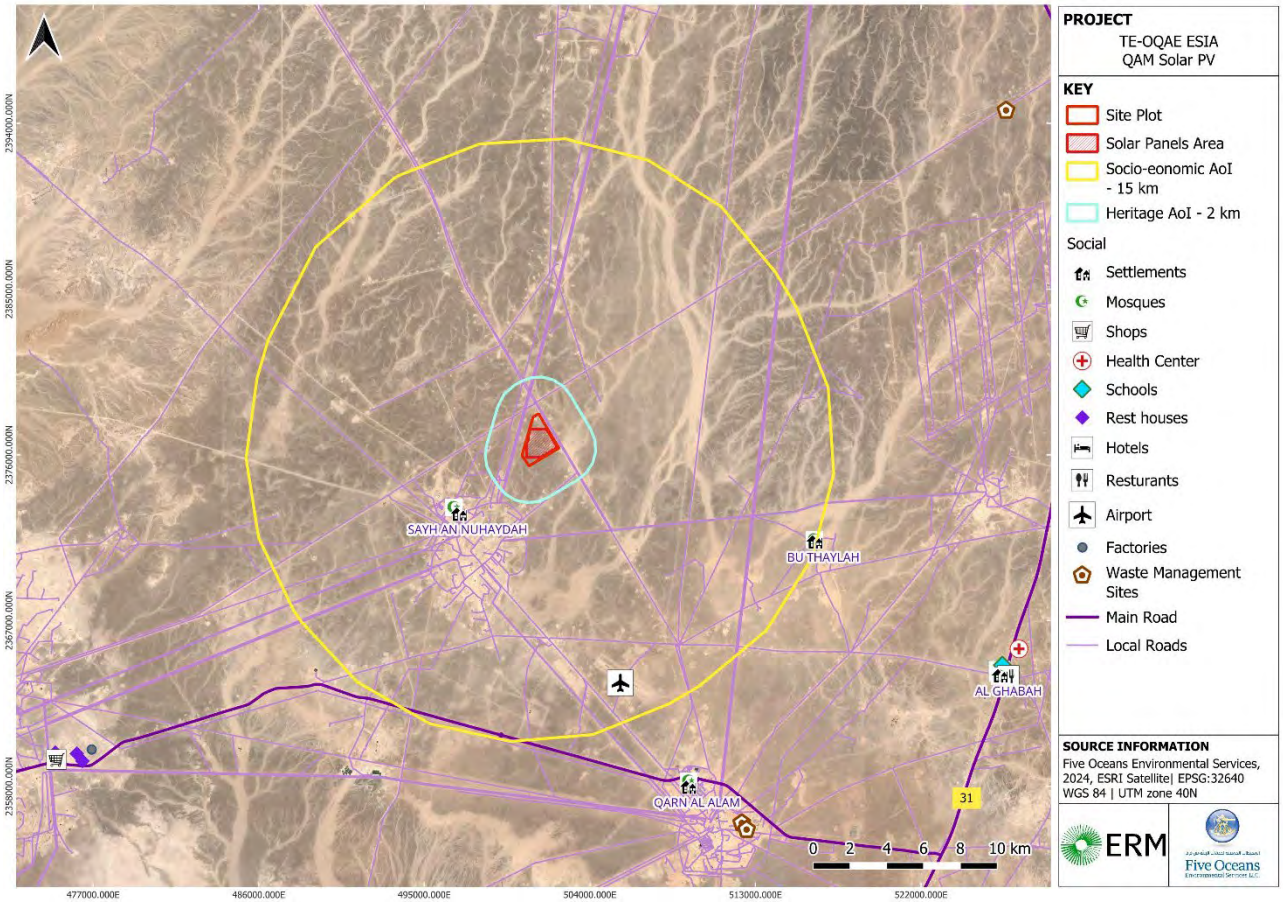
Saih Nihaydah (also spelled Sayh An Nuhaydah), located 4.9 km west of the Project site, contains several contractor camps for laborers working on the Saih Al Nihaydah gas field and associated facilities.

Additionally, Qarn Alam airport, situated approximately 11.4 km southeast of the Project site and within the Project's AoI, serves charter flights operated by Salam Air. These flights are exclusively for staff and contractors working in the Qarn Alam region, including Saih Nihaydah.

Figure 6.48 illustrates the Project's social AoI showing Abu Thaylah, Saih Nihaydah and Qarn Alam airport as the only receptors.

With respect to the AoI for cultural resources (cultural AoI), a distance of 2 km from the Project boundary has been adopted for the impact assessment. This represents the maximum distance that any disturbance of surface artifacts and resources may occur, particularly during the construction phase. The cultural AoI is shown in Figure 6.48 together with the social AoI.

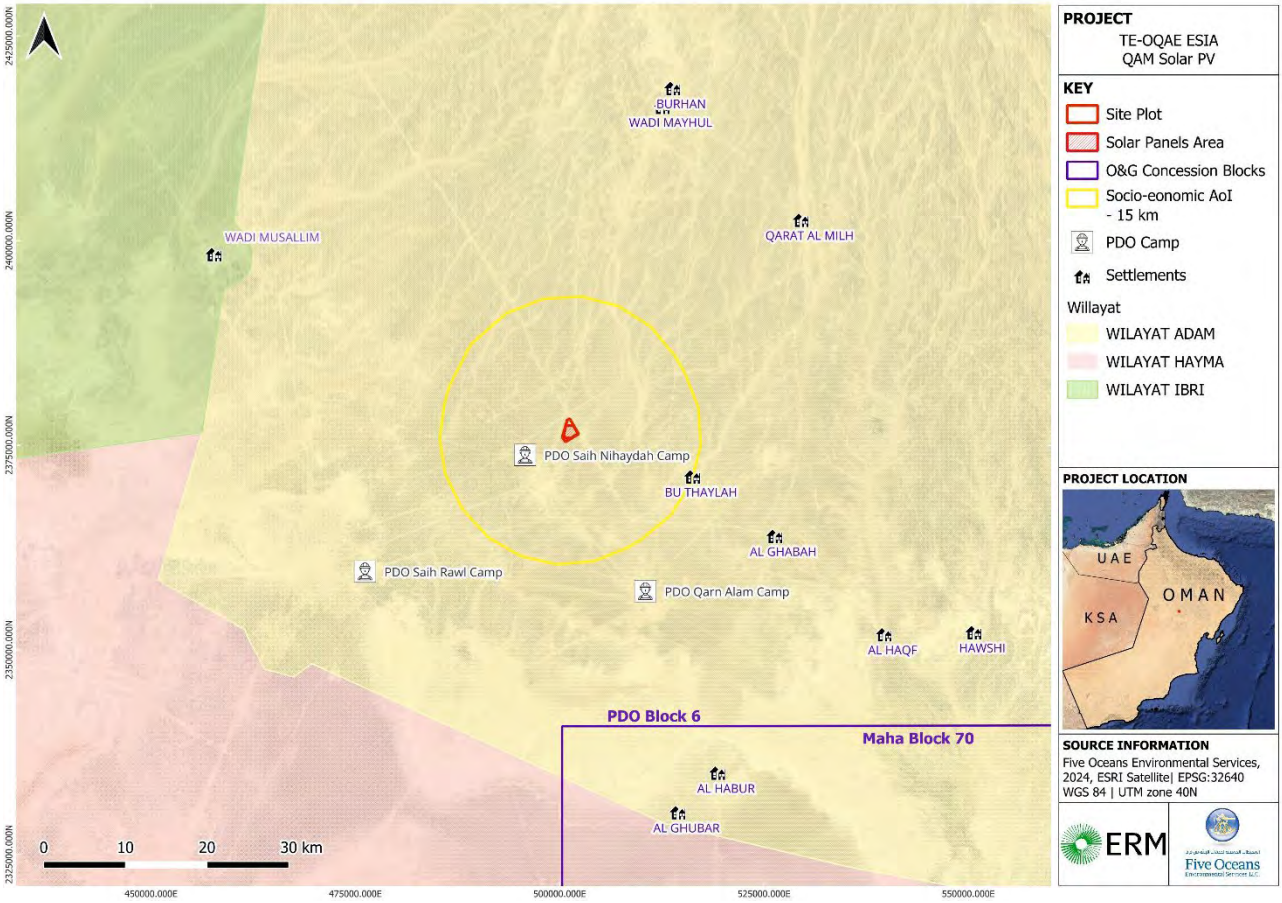
FIGURE 6.48 SOCIAL AND CULTURAL AREAS OF INFLUENCE AROUND NORTH OMAN SOLAR PROJECT



Source: 5OES, 2024

Figure 6.49 provides additional details about the administrative context of the Project site. It shows wilayat boundaries, oil and gas concession block boundaries, and the location of key facilities within the concession area, though outside of the social AoI— such as the PDO camp at Qarn Alam which is 19.4 km to the southeast of the Project site and the PDO Saih Rawl Camp, located approximately 29 km from the Project site. Al Ghabah, another settlement located approximately 26 km to the southeast of the Project site hosts a primary school and a government health clinic. It should be noted that the localities of Qarn Alam, Sayh Nuhaydah, and Al Ghaba are primarily oil and gas operations and contractor camps, with residents being staff and workers who live there on a rotational basis due to the nature of their occupation. These areas do not have any permanent residents from the local communities, as confirmed by 5OES in 2023.

FIGURE 6.49 SOCIAL AND GOVERNANCE CONTEXT OF THE NORTH OMAN SOLAR PROJECT



Source: Five Oceans 2024

There are three main social aspects for the Project, which include:

1. Ecosystem services provided by the site; these are minimal since the grazing value of the site is very low;
2. Community health and safety that may be affected by traffic associated with the project, particularly during the construction phase; and
3. Economic development potential arising from commercial and employment opportunities during construction and operational phases.

Consideration has been given to vulnerable groups that may be impacted, such as:

- Livestock owners whose animals graze on the Project site, particularly those residing in Abu Thaylah;
- Groups with low literacy, including expatriate herders who may have disadvantaged backgrounds;
- Female-headed households in Abu Thaylah

6.3.3 METHODOLOGY

6.3.3.1 DESKTOP DATA COLLECTION AND REVIEW

The desktop data collection process consisted of a synthesized account of various information sources and references primarily sourced from the following:

- Published literature including supporting grey literature (previous reports, existing studies, etc.) sourced from websites / data portals of the government, academic and research institutions, social organizations, etc.:
  - Online government databases and statistical information in particular the Oman eGovernment Service Portal of the Sultanate of Oman and the National Centre for Statistics and Information (NCSI);
  - Reports published by multilateral organizations;
- Non-technical literature (news paper articles, etc.);
  - References from previous ESIA studies (e.g., Manah II Solar Farm, HMR 2023) that are publicly available for recent projects in the same geographic region.

The desktop information gathered primarily provided contextual data on socioeconomic, health, human rights conditions at the national and regional levels (Governorate and Wilayat). It also included cultural (archaeological) distribution information. Additionally, where available, information at the AoI level was included, mainly through the review of NCSI data holdings and stakeholder engagement.

6.3.3.2 PRIMARY DATA COLLECTION AND ASSESSMENT

A one-day stakeholder engagement event took place on 14th of July 2024, at the Wali of Adam's Office. The event was led by the 5OES social engagement team, accompanied by a representative from the proponent's development team (hereafter referred as 5OES Socioeconomic and Health Fieldwork July 2024). The purpose of the engagement event was:

- To disclose the Project to key stakeholders in Wilayat of Adam;
- Collect socioeconomic and health information at Wilayat level, to expand on specific issues identified during the scoping desktop review; and
- Document stakeholder opinions, questions, concerns and expectations to inform the ESIA.

The primary data collection process was guided by the key issues and information gaps identified during the desktop data review process and scoping study.

Data collection stakeholder engagement activities consisted of Focus Group Discussions (FGDs), Key Informant Interviews (KIIs) and settlement profiling activities. This process was qualitative in nature.

Socioeconomic and health baseline data collection engagement activities were conducted in accordance with the principles of engagement of TTE and OQAE in line with Omani legislation, International Finance corporation (IFC) standards and good international industry practice.

The stakeholder engagement event comprised two separate meetings; one with the Wali of Adam in the presence of other local government representatives and community representatives, and another with the Omani Women's Association of Adam.

National level data collection efforts continued after the stakeholder engagement activities. Specifically, follow-up data requests were sent to the points of contact at the Wali's office and other relevant stakeholders to collect more quantitative data on specific aspects of the Project, such as the number of job seekers in the Wilayat of Adam.

At the start of each meeting, an introduction was given to the stakeholders, describing the Project and the ESIA process. This was followed by a presentation of high-level environmental and social impacts of the Project, and the stakeholder engagement schedule for this phase of

the ESIA. Discussions followed on various topics including, but not limited to, confirmation of the presence of inhabitants or land users in the AoI, community health, infrastructure and public services, livelihoods (predominantly agricultural activity), employment, worker issues, gender issues, cultural change, health and education. Recommendations and opinions were solicited from those stakeholders at the meeting, and follow-up actions reviewed and agreed upon by the attendees, the Project proponent, and the consultant team during the stakeholder meeting on 14 July 2024.

Further site visits and stakeholder meetings have contributed to refining the social baseline. This includes:

- A site visit to the Project site and social receptors in the AoI, notably Abu Thaylah, conducted on 30 June 2024, and
- An engagement meeting with PDO on the 23 July 2024 to understand the environmental and social baseline conditions from their perspective.

The information and feedback from stakeholder engagement meetings have been incorporated into the physical, ecological and social baseline chapters, and have been considered in determining mitigation measures in the impact assessment and ESMMP of this study. The minutes of meetings are available to the Project proponents so community development needs can be incorporated into project-specific plans. Meeting minutes are presented in Appendix F.

6.3.3.3 LIMITATIONS

Information gaps remain in the socioeconomic baseline, as engagement activity will continue, particularly with the Wali of Adam's office, and PDO social team. Additional data from these stakeholders is needed to gather or validate findings, such as information on PDO camps and wells in the AoI. Engagement with government officials has been conducted at the Wilayat level, rather than at the community level, although the site visit on 30 June 2024 incorporated meetings with the sheikh of Abu Thaylah. Further stakeholder engagement and disclosure is scheduled which will help to close existing information gaps and reduce assumptions and uncertainty.

There are also limitations arising from population and socio-economic data sources having different reference years. Population statistics could therefore be inaccurate, and interpreting data with differing reference years may also be inaccurate. This includes the lack of general statistics at the wilayat level, limiting the ability to provide localised, detailed information relevant to the Project area.

6.3.4 COUNTRY CONTEXT AND ADMINISTRATIVE SUMMARY

The Sultanate of Oman shares borders with Saudi Arabia to the west, the United Arab Emirates (UAE) to the northwest, and Yemen to the southwest. It also has maritime borders with Iran and Pakistan, with the Arabian Sea to its southeast and to the northeast, the Gulf of Oman.

Administratively, Oman is divided into 11 administrative governorates (*muhafazah*). In alphabetical order, these governorates are Ad Dakhiliyah, Ad Dhahirah, Al Batinah North, Al Batinah South, Al Buraymi, Al Wusta, Ash Sharqiyah North, Ash Sharqiyah South, Dhofar, Muscat and Musandam. These governorates are further subdivided into a total of 61 provinces (Wilayat). The Project is located in the Wilayat of Adam in the Ad Dakhiliyah Governorate.

There are three levels of Government within the Sultanate of Oman: Central, Regional (or Governorate) and Wilayat. The Wilayat is considered as the most local scale at which the government operates, but the Wali's offices also maintain contact with sheikhs, appointed to represent tribal/family interests in specific areas where the tribe/family lives. Sheikhs are therefore an important channel by which communities interact with formal government bodies.

The Sultanate of Oman is a monarchy ruled by His Majesty Sultan Haitham bin Tariq Al Said since 2020. The Sultan presides over the Council of Oman, which comprises the Council of State (Majlis A'Dawla), and the Consultative Assembly (Majlis A'Shura).

The State Council, equivalent to a Cabinet of Ministers, is appointed by the Sultan and is the body that determines Government policy. The Consultative Assembly, on the other hand, is elected by the citizens, with one or two representatives for each Wilayat, depending on the Wilayat's population size.

Majlis al Shura representatives tend to be senior professionals already in government service, who perform their duty for four years. The role of the *Majlis Al Shura* is to ensure continual improvement in the delivery of government services in general and to allow the people's voice into heard in key Government decision-making processes. It operates in parallel with the Sheikh – Wali system of local government to provide an alternative channel for citizens to communicate with the government.

The Wali is the senior Government representative in each wilayat. Their main role is to communicate with the constituent communities through the *sheikhs*, facilitating government processes such as planning, policy development and implementation to proceed with due consultation and consideration. They are an employee of the Ministry of Interior and typically serve for a four-year term before being reassigned to another *wilayat* (jurisdiction or territory governed by a Wali). This rotation helps ensure transparent and unbiased decision making. In the context of the ESIA process, the role of respective Wali's is to coordinate with other stakeholders in the Wilayat, such as Majlis al Shura members, the municipality etc., for both engagement and disclosure meetings.

In November 1996, the Sultan introduced a Basic Statute of State, effectively Oman's first written constitution. In November 1996, the Sultan introduced a Basic Statute of State, effectively Oman's first written constitution which was later amended in 2011. In 2021, both respective Royal Decrees (101/96 and 99/2011) were repealed, as Sultan Haitham issued a revamped Basic Statute of the State with several amendments, the most important being the process for the appointment of a crown prince.

6.3.4.1 LOCAL DECISION MAKING

Settlements appoint a senior community member, the S*heikh*, who is usually a tribal elder, to represent them during engagements with the government and in relations with neighboring settlements; this title is social rather than religious. . Some Omani tribes elect their chiefs from a set of potential candidates. The candidates' strengths and weaknesses are weighed in discussions and debates until an agreement is reached on who is most suitable to lead the tribe. He is confirmed in his office as sheikh by the personal agreement of the tribal members. Each sheikh is registered at the Ministry of Interior at department of Tribal Affairs as the formal representative of the settlement or tribe. One of the sheikhs' main responsibilities is to engage with the government through the Wali's office (and other channels) and make the community's case for aspects of social development or express grievance on behalf of the

community. Minor disputes, petty crime, and other social issues within the community are also referred to the sheikh for judgement and settlement. The sheikh's role in a development project is to provide feedback about the communities that may be affected, including any relevant information about the community, such as commercial services offered by its members, that could benefit the Project. The relationship between the Wali and the sheikhs in the ESIA engagement process is important in order that the Wali's office is sufficiently well-informed about conditions and sentiment at the Project scale. This allows the Wali to accurately inform the Project Proponent and his consultant about any issues that are relevant to the Project. In due course, during the execution of the stakeholder engagement plan, the community liaison officer (CLO) appointed by the Project Proponent is expected to directly engage with the concerned sheikhs as appropriate.

6.3.4.2 LOCAL GOVERNANCE

In light of the outcomes of the Oman Vision 2040, development of governorates is taking place through decentralization of services and forming a local system in each governorate. Planning and development of a governorate would closely follow the principles of the Oman Vision 2040, the National Planning Standards developed by the Oman National Spatial Strategy (ONSS, 2023), and the individual Regional Spatial Strategies for each governorate.

The Governor's office takes lead in decision making heading various committees with relevant governmental and non-governmental stakeholders.

While this decentralization supports the objectives of Oman's Vision 2040, it has also influenced the modus operandi of each of the governorate representatives and provided a space for healthy competition, even at the Wilayat level.

In the case of the Wilayat of Adam, Adam its provincial capital, lies over 170 km to the north-east of the Project site, outside of the Project's socio-economic AoI. Nizwa is the administrative center for Ad Dakhiliyah Governorate. The Governor's Offices, Municipality Offices, and regional representative offices for the Environment Authority (EA) and the Ministry of Agriculture, Fisheries and Water Resources (MAF&WR) are located in Nizwa, 169 km to the north of the Project site, with some having offices in Adam.

All Ministries operate regional offices in each Governorate. Ministries generally maintain their regional offices in Nizwa for the Governorate of Ad Dakhiliyah with smaller branches of some in Adam. Examples of Ministries with relevance to the Project are as follows:

- The Ministry of Agriculture, Fisheries and Water Resources.
- Ministry of Labor (formerly Ministry of Manpower), which is responsible for delivery of the country's Omanisation policy, so essential consultees for all local labor recruitment.
- Ministry of Social Development, which is responsible for ensuring that people with low incomes are supported financially through a national social protection fund; all matters related to NGO establishment, including Omani Women's Association branches; and
- Ministry of Health, which is responsible for delivery of primary health care, hospitals and health education.

In general, municipalities handle a range of services including, urban planning, waste collection, street cleaning, recreational amenities, construction approvals, and the collection of municipal revenues, such as taxes levied on building lease agreements and advertising. Adam municipality, like all municipalities other than Muscat and Salalah fall under the mandate of the

Governor. Governors have the same rank in Government as Ministers. The system of wilayat is separate and distinct from that of the Governorates and their municipalities with Walis and directors of regional municipalities reporting to the Minister of the Interior.

6.3.5 PLANNING AND DEVELOPMENT

In 2011, the Government launched the Oman National Spatial Strategy (ONSS) project which further required Regional Spatial Strategies for the various governorates, including that of Ad Dakhiliyah Governorate. In March 2021, the ONSS was approved by His Majesty Haitham bin Tariq with the aim to deliver the Oman Vision 2040 and establish a broad framework to control and direct urban growth in the Sultanate in the next 20 years (Ministry of Housing and Urban Planning n.d).

Historically, Ad Dakhiliyah has been known for centuries as a center of thought and learning, as well as for its traditional handcrafts (Foreign Ministry of Oman 2024). In fact, Oman's National Spatial Strategy outlines its ambitions to develop each governorate economically based on their competitive advantage, which focuses on the knowledge economy in the case of Ad Dakhiliyah. The country intends to capitalize on the governorate's history and antiquity, making Nizwa a hub of high value economy focused on services and entertainment, including business, design, fashion, and culture. As Nizwa's economy grows, the neighboring wilayats such as Adam are expected to grow as well (Oman Observer 2021).

Supervision of the urban planning process in the wilayat including matters related to provision of municipal services, maintenance of public sanitation, building permits, lease management, as well as some aspects of land use allocation, occurs through the Governor's office and in coordination with the relevant ministries, as required.

Known development plans in the Project AoI include the continued development of the oil and gas fields as well as the Project to connect the main interconnected system (i.e., the electrical transmission network in northern Oman) with the Dhofar Power System, which will entail the installation of transmission lines which will pass through Saih Nihaydah.

In terms of Oil and Gas Concession areas, PDO operates across the country, and in particular Block 6 which extends over parts of the Wilayat of Adam in Ad Dakhiliyah governorate. Concession areas are not bound by jurisdiction limits of the Wilayat or Governorate.

6.3.6 DEMOGRAPHICS AND SETTLEMENTS

This section provides an overview of the demographics in the Sultanate of Oman as a whole as well as in Ad Dakhiliyah Governorate, and in the Wilayat of Adam, and the settlement of Abu Thaylah, more specifically.

6.3.6.1 POPULATION OVERVIEW

National level

In 2023, Oman's population estimate was 4.9 million (UNICEF 2024), with a population density of 16.8 per km^2 on average. Of this population, approximately 62.2 percent are male and 37.8 percent female, the skew caused by the disproportionate number of male expatriate laborers. The population is mostly urban (85 percent) and 42 percent of the population are expatriates. The latest national census was conducted in 2020 (Five Oceans, 2024).

The country population is relatively young; children (aged 0-17 years) account for 44 percent of the Sultanate of Oman's population and their number has risen by 16 percent between 2017 and 2021 (Al Abri 2023). It may be noted that the World Bank records a population split of 27 percent in the age group of 0-14, whereas 70 percent are in the 15-65 age group and 3 percent are those above 65 years of age. NCSI Statistical Yearbook 2023 presents data collected in 2022 fining 31 percent of the total population is under 19 years old. Yet, when looking solely at the Omani population, children under the age of 19 account for 46 percent of the Omani population (Al Abri 2023; NCSI 2023).

Nationally, the average household size was 7.2 people per household in 2020 (NCSI 2020).

The key human development indicators for Oman with regards to demographics and life expectancy are presented below.

TABLE 6-21 KEY HUMAN DEVELOPMENT INDICATORS FOR OMAN

Human Development Indicator	Oman Data (2022)	Middle East and North Africa (average for 2022)
Life expectancy at birth (years)	73.9	74.1
Child (0-14) dependency ratio (per 100 people aged 15-64)	38.5	46
Old-age (65 and older) dependency ratio (per 100 people aged 15-64)	3.9	8.4
Sex ratio at birth (male to female births)	1.04	1.05
Urban Population (%)	87.8	66.1
Net migration rate (per 1,000 people)	-4.5	-0.75

Modelled data based on 2010 census data.

Source: UNDP 2024, World Bank 2024

Population growth in Oman has been largely driven by the rise in the expatriate population rather than by the natural growth rates of the Omani population. Data indicates that population in Oman increased by 1.5 percent between 2022 and 2023. The largest overseas communities come from India and the Philippines and represent more than half of Oman's labor force.

Governorate and Wilayah Level

In 2020, the total population of the Ad Dakhiliyah Governorate was estimated to be 478,501 (57.9 percent male and 42.1 percent female), with an average population density of 15.04 per km^2 (NCSI, 2024). Adam is the largest Wilayat in land size within the governorate and has an estimated population of 31,000with an average population density of 1.34 per km^2 (City Population 2022).

The population in the Wilayat of Adam comprised approximately 33 percent expatriates. Census data from 2020 indicates that in the Wilayat of Adam the gender structure is skewed

towards males, with 61 percent, and females making up 39 percent of the population, due to the contribution from predominantly male expatriate labor force in the area. This demographic is also indicated in the age structure of the population, which has a disproportionate contribution from working age group (15 – 64-year-olds) of around 70 percent, with 27.5 percent of 1-14 year olds, and 2.7 percent in the over 65 year old group. Moreover, Adam is predominantly rural, with the lowest population density of its governorate, it being the smallest Wilayat in terms of population but the largest one in terms of area.

Settlements in the Social Area of Influence

According to the 2020 census data, the total estimated population in the settlement of Abu Thaylah was of 161 inhabitants, 43 percent of which were non-Omanis. This percentage reflects a larger portion of foreign population than the Wilayat level. Further details on the key demographic indicators for each settlement are summarized in Table 6-22.

TABLE 6-22 POPULATION INDICATORS FOR SETTLEMENTS IN THE AOI

	Total population	Omani	Non-Omani	Male	Female	0-14 years	15-64 years	65+ years
Abu Thaylah	161	92 (57.1%)	69 (42.9%)	106 (65.8%)	55 (34.2%)	27 (16.8%)	127 (78.9%)	7 (4.3%)

Source: City Population, 2020

6.3.7 ETHNICITY, LANGUAGE AND RELIGION

Oman's population is predominantly Arab, with some minorities from South of Asia, including India, Pakistan, Sri Lanka, and Bangladesh. Other ethnic minorities in Oman are Baluchi, Iranian, and African, mostly from the east coast (CIA 2024).

The official language of Oman is Arabic, but English is also spoken widely. Additionally, provided the ethnic composition of the population, Swahili, Urdu, Farsi, and Baluchi are also used in the country (Spain - Diplomatic information office 2024). Some tribes living within 50 km of the Project site (e.g., Harssusi), maintain a distinctive culture, lifestyle, and language. In the Arabian Peninsula, the term "tribe" (*qabila* in Arabic) constitutes a complex network of families and clans that are knitted together by shared lineages, customs and alliances (Jamestown Foundation, 2011). In the Wilayat of Adam the main tribes Al Durai, Al Harassis, Al Janaba, Al Junaibi, Al Wahiba and Al Jahafi, have traditionally adopted a Bedouin lifestyle with raising livestock being their main livelihood. The Al Durai tribe dominates the population around Qarn Alam, and the village of Abu Thaylah is an Al Durai settlement. In this ESIA, the Bedouins are regarded as part of the local community rather than as indigenous people for the following reasons:

TABLE 6-23 COMPARISON OF IFC PERFORMANCE STANDARD 7 INDIGENOUS PEOPLES CRITERIA AND PROJECT APPLICABILITY

Criteria for consideration of 'indigenous peoples' according to IFC Performance Standard 7	**Reasons why IFC Performance Standard 7 criteria do not apply to the Project**
Self-identification as members of a distinct indigenous cultural group and recognition of this identity by others.	The tribes with traditionally Bedouin lifestyle in Oman do not identify themselves as 'indigenous' in a way that distinguishes them from other Omanis. They view themselves as an integral part of the broader Omani society, have equal rights and access to all citizens of Oman and are protected under the country's general legal framework. Additionally, Oman does not have any specific laws that exclusively address the rights of the Bedouin people.
Collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories.	Most contemporary Bedouins live in permanent residences rather than following the traditional nomadic lifestyle. Younger generations are increasingly seeking higher education and employment in urban areas.
Customary cultural, economic, social, or political institutions that are separate from those of the mainstream society or culture.	Bedouinism and pastoralism are embedded within the broader Arab cultural and lifestyle traditions and do not maintain separate institutions from the rest of the Omani population.
An indigenous language, often different from the official language of the country or region.	While some bedouin tribes have their own language (e.g. Harssusi language spoken by the Al Harassis tribe), all bedouin tribes in Oman speak Arabic, which is the country's official language.

Source: ERM and 5OES, 2024, based on interpretation of IFC Performance Standards

Islam is the primary religion in Oman with 85.9 percent being Muslims, and only 6.5 percent Christians, 5.5 percent Hinduists, and less than 1 percent Buddhists, according to the European Centre for Law and Justice (ECLJ, 2020). . Ibadism, a branch of Islam, is the dominant religion in Oman followed by Sunnis. While Shia Muslims constitute slightly less than 5 percent of the Omani population, they are well integrated into society (Oxford Business Group n.d.).

The majority of non-Muslims are South Asian migrant workers who practice a variety of faiths, including Buddhism, Sikhism, Christianity and Hinduism (Oxford Business Group n.d.). All

religious organizations in Oman are required to register with the Ministry of Endowments and Religious Affairs (Oxford Business Group n.d.).

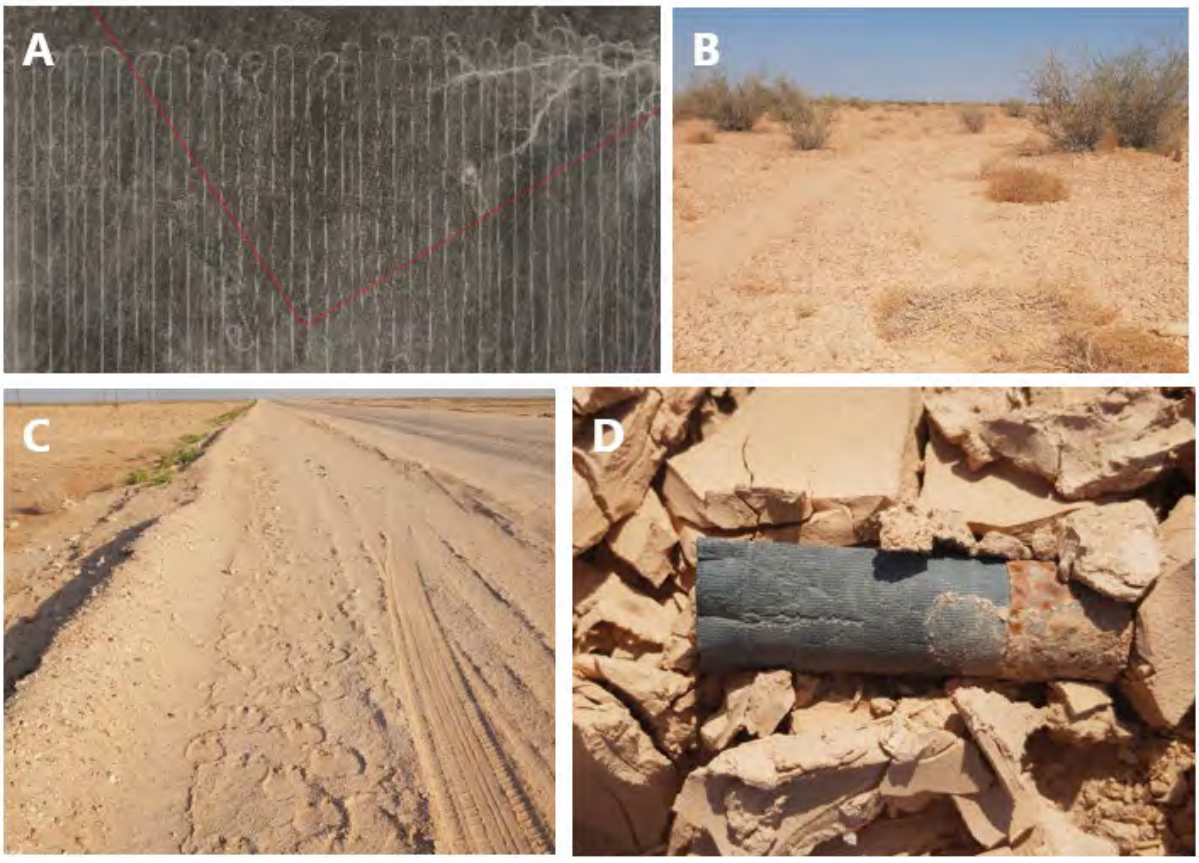
There is one religious building within the Project's AoI, which is a mosque located in the village of Abu Thaylah, 14 km to the south east of the Project site.

6.3.8 LAND USE AND LAND OWNERSHIP

6.3.8.1 LAND USE

The predominant land use around the Project site is hydrocarbon exploration and production, which is expected given the Project's purpose of supplying power to PDO for its operations and its location in Block 6. The demand for electrical power in the area originates from PDO's oil and gas operations at Saih Nihaydah and Qarn Alam .PDO now requires a low carbon intensity source, i.e., renewable energy to meet this demand. Although the site itself has no producing wells on it, the area has been surveyed several times over the years using seismic methods to explore for hydrocarbons, most recently between 2020 and 2022. The site is also, to some degree, degraded by borrow pits that were opened to supply fill material, presumably for the construction of well pads and the local road network.

FIGURE 6.50 LAND USES ON SITE AND IN THE VICINITY



Notes: A: Tracks of recent (between 2020 – 2022) seismic surveys in the southern portion of the project site. B: Seismic surveys cause scarring to the sensitive deflated soils on site and a degree of ecological damage in vegetated areas, in this case the vegetated wadi 1.5 km to the southeast of the Project site. C: Evidence that the vicinity of the project is grazed by camels is apparent, and signs of camels access the Project site was also observed in November 2023 and again in May 2024. D: Evidence of hunting in the vegetated wadi 6.5 km to the southeast of the Project site. This shotgun cartridge appears to be several years old.

Traditionally residents of the area have used the Project site and wider Concession Area for pastoral grazing activities. Livestock include camels, goats and sheep that graze and browse extensively over the desert rangelands including in the more vegetated wadis adjacent to and within the Project site. Depending on how much rain falls in any particular year, livestock generally require supplementary feeding with concentrate or fresh feed, both of which represent a significant direct cost to the owner. As well as providing a source of income and sustenance, livestock is significant in terms of social status, particularly in connection with camels. Goats are also significant in a religious and cultural context, as goats are traditionally slaughtered and consumed during both Eid Al Fitr (at the end of Ramadan) and Eid Al Adha (approximately two lunar months after Eid al Fitr).

The degree to which the Project site is valued by the surrounding communities was investigated during the community and stakeholder engagement meetings that took place at the Wali of Adam's office on 14 July 2024. The Wali mentioned that the residents of Abu Thaylah graze in the area, but the importance of the Project site as a grazing area could not be confirmed by those attending the stakeholder's meeting. The minutes of meetings of these engagements are presented in Appendix F.

In terms of ecosystem services provided by the Project site, while there is evidence of camel access, the relative lack of vegetation and the extent of similar habitat in the surrounding areas suggest that the site has little value for grazing.

Camels roam extensively in the area, and during normal dry conditions the best grazing is to be found in the wadi systems within 25 km of the Project site. Observations made on site during ecological field surveys have observed camels ranging on land adjacent to the Project site (within 5 to 10 km to the east), and camera trapping on site has recorded groups of 3 to 7 camels at the site on ten occasions between 15 May – 30 June (45 days). Palatable vegetation in these wadi systems show signs of intensive browsing by camels and goats, with sharply defined browse lines on indicator species such as *Prosopis cineraria* trees and stunted growth forms in *Ocradenus arabica*. There are also indications of hunting occurring in this area, albeit indicators are limited (one shot gun shell observed to date) and several years old.

The situation with respect to grazing changes after rain. Following rain during April 2024, a herd of 25 camels accompanied by a stockman in a 4x4 vehicle, was observed on 13 May and again on 17 May 2024, grazing on rangeland a few kilometers to the east of the Project site, on gravel plains with dwarf shrub cover.

In summary, the Project site itself provides very little grazing value for livestock, but the surrounding area is valued as rangeland as grazing and browsing grounds, particularly after rainfall events.

6.3.8.2 LAND OWNERSHIP

The Project site, which falls within Block 6, is owned by the Oman Government and leased to PDO under a Concession Agreement. The current concession agreement, signed in 2005, is due to expire in 2044. Under the agreement, PDO and its partners have the right to carry out activities to explore and produce oil from Block 6.

Residential land

In the Sultanate, since the issuing of the Land Law in 1980, Omanis have been eligible to be granted free land from the government as stipulated in the Land Law (RD 5/80) and more recently in Ministerial Decree 5/2011. According to MD 5/2011 every young Omani is granted a piece of land of minimum 600 m^2, which can accommodate up to 360 m^2 of built-up area with 60 percent plot coverage.

Expatriates are not allowed to own residential land in designated places per Royal Decree 29/2018 and tend to be limited to owning properties within integrated tourism complexes. Specifically, according to Article 1 of the Royal Decree, the ownership of real estate and land by non-Omanis is banned in the following locations: Liwa, Shinas, Musandam, Buraimi, Dhahirah, Masirah, Dhofar (except Salalah), Jebel Akhdar, Jebel Shams.

Plots of land are allocated by the Ministry of Housing and Urban Planning (MOHUP) for residential development, either for private development or for social housing projects. Land has been allocated to residents of Abu Thaylah for housing.

Agricultural land

Ownership and access to agricultural land is usually obtained through four possible channels:

- Government granted agricultural land;
- Traditional access rights;
- Land obtained through inheritance; and
- Land purchase.

In the case of land granted by the government, arable farmers make a demand for a land grant through the Wali which is then processed in coordination with the Ministries of Housing and Urban Planning and Agriculture, Fisheries and Water Resources. The size of the land granted is usually 10 feddan (4.2 ha). Non-Omani citizens are not allowed to own land for agricultural purposes.

Access to rangeland and activities associated with grazing (including the erection of azbah), which is typically on public access land owned by the government, are regulated through a system of verbal social licenses that are agreed by representatives of the local communities (sheikhs), based on long held traditional rights. Disputes that cannot be resolved between the concerned sheikhs is elevated to a committee that sits at the Wilayat level. Private wells can only be installed on privately owned land.

Within the AoI, other than in Abu Thaylah, there are no agricultural lands identified.

6.3.9 ECONOMY

National Overview

Oman's macro-economy is heavily dependent on its oil and gas sector, which accounted for 74.5 percent of the overall gross domestic product (GDP) in 2022, rising from the 72.7 percent in the previous year. Within oil and gas activities, output from crude oil increased 11 percent in 2022, while natural gas output also increased by 5.9 percent that year. Regarding non-hydrocarbon GDP, real growth largely came from the service sector with 4.2 percent of growth in 2022, while other industrial activities and agriculture and fishing declined by 2.9 percent and 9.7 percent respectively (Central Bank of Oman, 2022).

Economic growth is predicted to improve slightly to +2.8 percent in 2024, up from an estimated +2 percent in 2023. Accelerated production at the country's main downstream petrochemical projects (refineries and plastic production) is one of the reasons why industrial growth is set to increase to 3 percent in 2024 (Moneta, 2024).

The Sultanate of Oman's gross domestic product (GDP) at constant prices rose by 1.7 per cent at the end of the first quarter of 2024, totaling OMR 9.537 billion, up from OMR 9.373 billion in the same period of 2023 (Oman News Agency, 2024). Growth in National GDP from 2021 to 2022 rose by 30 percent to US$ 114.67 billion, according to official data from the World Bank (2022), reflecting the economic recovery following the COVID pandemic in previous years. The GDP per capita in 2022 was US$ 25.06k.

Real GDP grew by 4.3 percent in 2022, primarily driven by a strong expansion of the hydrocarbon sector. In 2023, however, economic growth was projected to slow down to 1.3 percent and then to rebound to 2.7 percent in 2024. Nevertheless, non-hydrocarbon growth was projected to rise to 2 percent in 2023 and a further 2.5 percent in 2024, from actual growth in this sector of 1.2 percent in 2022.

Average inflation declined from 2.8 percent in 2022 to 1.6 percent during January-April 2023 (year-over-year), reflecting lower food inflation and a stronger US dollar.

The non-petroleum sector is an important focus for sustainable development and for creating adequate employment opportunities in Oman, and concerted policy efforts are underway to promote activities in the sector. Government policy in this regard is aimed at stimulating two aspects of the national economy in particular: i) the green energy sector, and ii) the development of Omani owned small and medium sized enterprises (SMEs).

Economic Sectors

Oil and Gas

The contribution of the conventional energy sector remains critical for Oman's economy, despite an increasing strategic focus on non-oil economic activities to promote diversification in the economy. However, since 2015 the percentage contribution of oil and gas activities to Oman's GDP has gradually declined, though it still dominates strongly, accounting for 72 percent in 2023. This slight decline in the contribution from the oil and gas sector suggests a modest decoupling of overall GDP from the sector due to economic diversification, in line with Government policy. The majority of the remainder of the country's GDP comes from the industrial sector.

Mining

Mining is one of the Oman government's focus sectors under its economic diversification program. Oman's mining industry has attracted increasing interest from both foreign and local operators. Oman's mineral resources include chromite, dolomite, zinc, limestone, gypsum, silica, copper, gold, cobalt, iron and potash. The Project site is located within a Mining concession area No. 61 which contains commercial deposits of marble and limestone.

Logistics and Transport

The Oman Logistics Strategy 2040 lays out long-term objectives to increase the contribution of the logistics sector to GDP, by becoming a global logistics hub by 2040.

All seven commercial ports in Oman are state owned and the major ports are located in Muscat, Sohar, Salalah and Duqm. Road construction is another major focus of domestic and regional development. The Ministry of Transport, Communication and Information Technology (MTCIT) website provides details of significant completed and on-going road construction projects across the country. Current projects include the Al-Rusayl-BidBid road expansion project connecting the governorates of Ad Dakhiliyah, Al Wusta, Dhofar, North Al Sharqiyah, South AL Sharqiyah to Muscat Governorate and the rest of the governorates (MTCIT, 2024; Al Nahdi, 2023).

Manufacturing

According to the Ministry of Commerce and Industry, the 'Industrial Strategy 2040' aims to triple the contribution of the manufacturing sector by 2040, to reach a total of OMR 11 billion per annum. The strategy outlines the key targets which include increasing non-oil commodity exports to OMR 24.9 billion and attracting investments at an annual rate of OMR 2 billion, with a cumulative investment of OMR 40 billion by 2040.

Manufacturing activities are accorded priority in the Omani Tenth Development Plan (2021-2025) which includes hi-tech industries especially in the health services sector. Oman's manufacturing industry has been growing steadily since the 1970s, when it accounted for 0.8 percent of GDP, compared to 9.6 percent in 2020 (Oman Observer, 2023).

Fisheries

Before oil was discovered in the 1960s, 90 percent of the Omani population derived their livelihoods from agriculture and fishing. Fisheries remain Oman's second largest natural resource base, and the country aims 'to create a profitable world-class sector that is ecologically sustainable and a net contributor to Oman's economy,' by 2040.

Oman's extensive coastline, which is over 3,000 km long, hosts many purpose-built fishing harbors as well as many more traditional fish landing sites on both the Gulf of Oman and the Arabian Sea coastlines. The national catch comprises small pelagics such as sardines, large pelagics such as bluefish, mackerel, and tuna, and high value invertebrate species including cuttlefish, lobster, oysters and abalone. The fishing sector is dominated by traditional inshore fisheries that use open skiffs (for day fishing) and wooden dhows (for multi-day fishing), but there is also a limited commercial fleet operating in the 400,000 km^2 exclusive economic zone waters it controls and regulates. Through Fisheries Development Oman, an Omani government company, significant investment into the national commercial fleet has been made over recent years, which targets small and medium size pelagic species in areas beyond territorial waters to minimize competition with the traditional inshore fishing fleet.

According to the Ministry of Agriculture, Fisheries and Water resources (MAF&WR)[6], fish is considered, after crude oil, the second most important export commodity in terms of foreign exchange earnings. Also, it is estimated that over 280,000 individuals depend to some degree on income from the fishery sector (FAO 2015).

Agriculture

The modernization of the agricultural sector and development of rural farms represent key pillars of Oman's Sustainable Agriculture and Rural Development Strategy (SARDS) towards

[6] The Ministry of Agriculture, Fisheries and Water Resources (MAF&WR) is the responsible management authority in the Sultanate of Oman for fisheries.

2040 (MAFWR, 2016). Developed in June 2016, the vision set out in SARDS 2040 is to achieve 'a sustainable and profitable agriculture and rural sector contributing to the achievement of food security and Oman's overall development objectives. SARDS 2040 focuses on increasing crop and livestock sectors' competitiveness, make farming practices more sustainable, specifically the more efficient use of natural resources, primarily water, and improving resilience of agricultural and rural livelihoods to climate change and natural disasters.

Tourism

Oman has made progress over the years in establishing itself as a destination for tourism with numerous luxury and eco-friendly tourism projects emerging along the coast and in key areas of the interior. In 2023, international visitors injected OMR 1.1 billion into the economy, increasing by 69 percent the previous year's numbers. The World Travel & Tourism Council estimates tourism to achieve 7.6 percent of contribution to the country's GDP in 2024, and 9.8 percent by 2034 (WTTC, 2024).

Governorate Level

Oil and Gas Infrastructure

Block 6, located in central and southern Oman, spans from the north to the south of the country and covers 40 percent of its land acreage. In 2015, it accounted for over 69 percent of Oman's oil production and more than 92 percent of its gas production (Ministry of Finance of Oman, 2021). Operated by PDO, Block 6 is also the center of current enhanced oil recovery (EOR) operations. The Government of Oman owns 60 percent of Block 6, with the remaining 40 percent being owned by Private Oil Holdings Oman Ltd. (POHOL). At its turn, POHOL is owned by Royal Dutch Shell (85 percent), TotalEnergies (10 percent), and Partex Oman Corporation (5 percent). Regarding operations, Block 6 is operated by PDO, which is owned by the Government of Oman (60 percent), Royal Dutch Shell (34 percent), and TotalEnergies (4 percent).

This block uses all four of the EOR techniques with the Marmul field (polymer), Harweel field (miscible), Qarn Alam field (steam), and Amal–West field (solar). Solar EOR at Alam–West in southern Oman, completed by GlassPoint Solar in 2012 and commissioned in early 2013, was the first solar EOR project in the Middle East. This project uses the production of emissions–free steam that feeds directly into current thermal EOR operations, reducing the need to use natural gas in EOR projects. The facility itself, called Miraah, generates 330 MW of solar thermal power using parabolic mirrors housed in six large greenhouse structures, each approximately 10 ha in area.

At the governorate level, oil and gas, mining, logistics, manufacturing and agriculture all play a vital role in the economic status of the region. Growing quite exponentially is the tourism sector as the governorate offers an array of destinations and attractions. Development plans for the governorate capitalizes on its tourism and heritage potentials, biodiversity, quality agricultural seasons and industrial cities. The governorate is set for a significant infrastructure upgrade with over OMR 22 million allocated for various projects in 2024, including a fodder market in Adam and many road projects.

Local (AoI) level

Adam is predominantly rural, with small settlements scattered throughout the Wilayat. The economy is mainly driven by the oil and gas sector, represented in the AoI by the conventional

oil field Block 6. The Wilayat of Adam hosts operating oil and operating natural gas pipelines and encompasses large fields such as Qarn Alam, Saih An Nihaydah, Saih Rawl and Khazzan.

Engagement with the Wali of Adam and other stakeholders in June 2024 confirmed that raising camels for sale, and employment and provision of services to the oil and gas sector were important to communities in the Project area as well as specifically Abu Thaylah which is located in the Project AoI.

6.3.10 INCOME AND EMPLOYMENT

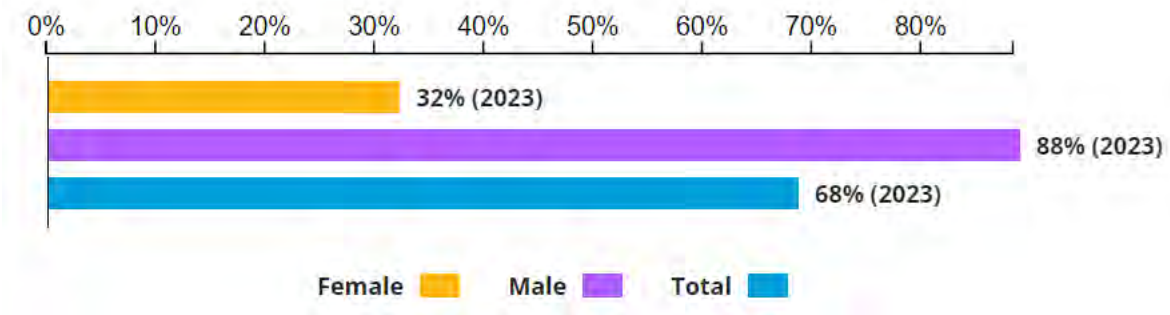
6.3.10.1 INCOME

Oman's average monthly household income has seen an increase in the past years, rising by 21.5 percent between 2011 and 2019. According to a survey conducted by the National Centre for Statistics and Information (NCSI), the income reached OMR 1,173 ($3,062) compared to OMR 965 ($2,520) in 2011.

The percentage of government pension and national insurance income, which 15 percent of Omani households depend on, recorded an increase to 9.5 percent compared to 5.5 percent in 2011, according to the results of the Household Income and Expenditure Survey released by the National Centre for Statistics and Information (NCSI). The percentage of transfers and other sources of income also increased to 2.6 per cent, compared to 1.2 percent in 2011.

With regards to differences between gender in labor participation, Figure 6.51 presents the labor force participation rate in 2023 for female, male and total population aged 15+, based on International Labour organization (ILO) estimates. The figure shows that 88 percent of men and 32 percent of women in Oman are employed. There are at least two factors to consider when interpreting this information. The first is that expatriate labor in Oman is strongly dominated by males a significant proportion of whom are employed as laborers in the contracting sector, but with a relatively minor contribution of women expatriates who are employed in the health and domestic sectors. Secondly, cultural factors stemming from a conservative Islamic society, particularly in rural areas, that have been a barrier to women regarding access to secondary and higher education and employment opportunities.

FIGURE 6.51 LABOR FORCE PARTICIPATION RATE (PERCENT OF POPULATION)



Source: World Bank Oman Gender portal based on ILO estimates, 2023

6.3.10.2 EMPLOYMENT

At a national level, the labor force was of 2.316 million in 2023 (World Bank, 2023). The main employers within the different economic activities of the private sector of Oman in 2022 were: Construction employed 25 percent of workers, with a total of 524,191 workers, comprising of

85.3% expatriate and 14.7% Omanis; Wholesale, Retail Trade & Repairs of Vehicles and Motorcycles employed 15 percent of workers, with a total of 307,242 workers, comprising of 81.7% expatriate and 18.3 % Omanis and Manufacturing employed 12 percent of workers, with a total of 254,642 workers, comprising of 72.2% expatriate and 23.8% Omanis. Agricultural, Forestry and Fishing employed 6 percent of workers in 2022 (NCSI, 2023).

Women are more likely to access employment opportunities in the public sector, though they also have opportunities for office-based jobs in the private sector and participate in agricultural livelihoods including herding and rearing, and post-harvest fisheries. Access to job opportunities remains a significant challenge for Omani youth, both male and female, as reflected in youth unemployment statistics. Male youth generally have greater opportunities with fewer social barriers to entry, particularly in the oil and gas sector and manufacturing sectors.

Since 1988 Oman introduced the policy of Omanisation aimed at replacing expatriate workers with trained Omani personnel. NCSI 2017 statistics show that there is a clear division between Omanis and Expatriates in terms of the types of employment with the majority of Omanis (92 percent) employed in the public sector, and the majority of expatriates (84 percent) employed in the private sector. This is attributable to a number of factors:

- A preference among Omanis to be employed by the public sector arising from higher remuneration and benefits and more job stability.
- A skill mismatch between the needs of private sector businesses and the skills of the Omani labor force.

The rate of unemployment at a national level decreased from 2.9 percent in 2020 to 2.5 percent in 2021 and 2.3 percent in 2022. However, unemployment levels rose in 2023 when NCSI reported that the national rate of unemployment was 5 percent in February 2023 which decreased to 4.10 percent in March 2023.

The World Bank estimated unemployment among the Omani youth was 49 percent in 2019, making job creation a critical challenge for Oman. A recent World Bank report confirmed that unemployment remains higher among Omani youth aged between 15 and 24, particularly among young women. As a result of dissatisfaction, in 2021, unemployed youth organized a 5-day protest over unemployment rates in several cities. Many of Oman's youth were demanding more than jobs: structural economic reform, social justice, and expanding powers of the elected Shura Council. In response to the protests, Oman announced a plan to create 32,000 jobs in 2021 in the public and private sectors as part of the 10th Five-Year Plan (2021-2025) set by the Ministry of Economy and relevant government agencies to help restore the momentum of economic growth (Oman Observer, 2021). Protesters claimed that foreigners have better and more opportunities in the private sector than Omanis, even in cases in which Omanis are more skilled and have higher education. They argued that the sponsorship system facilitates the abuse of foreign workers and limits Omanis' opportunities and prevents them from competing based on qualifications.

To address unemployment at a systemic level, government policy has been formulated to generate more organic employment opportunities by i) enforcing in country value targets that ensures that businesses achieve quotas of Omani employees and mandates that services provided by Omani SMEs are prioritized, ii) reducing the number of foreign residents in the country, and iii) investing in a young professional training scheme that subsidizes the salary of recent graduates entering the private sector for a period of two years.

These policies are largely aimed at the private sector where there is greatest potential to increase employment of Omanis, since it is the largest employment sector. Analyzing the economic recovery from the COVID pandemic, the World Bank report (2022) showed that after a decline in 2020, the number of Omanis employed in the private sector has recovered, and as of January 2024, it is estimated that about 274,894 Omanis were employed in the private sector (Al Maashaani 2024) compared to an average of 262,300 in 2019, before the pandemic hit.

Unemployment is not as high in Wilayat of Adam compared to other Wilayats. Official statistics on the number of jobseekers registered with the Ministry of Labor, were not available at the time of drafting this report.

With regards to gender, the unemployment rate of women (age group 15+) was estimated at 9.3 percent in 2023 while the unemployment rate of men (age group 15+) was estimated at 1.7 percent (NCSI 2024). Around 44 percent of unemployed women are in the age groups 15 to 24 and 25 to 29 (NCSI 2024). According to 2023 data by the NCSI (2024), female unemployment rates are highest among holders of higher diplomas (18.3 percent) and bachelors' degree (17.0 percent).

According to the United Nations Development Programme (UNDP)'s, Gender Inequality Index (GII)[7], inequalities between women and men have decreased from 0.368 in 2004 to 0.267 in 2022 (UNDP 2024). According to the United Nations Information Service in Geneva (2024), in 2022, women's participation in the labor force rose by approximately four percent, reaching 32 percent, up from 28 percent in 2021. The proportion of female entrepreneurs grew from 29 percent in 2021 to 32 percent in 2022, and the percentage of women business owners reached 6.1 percent that same year. In 2022, Ad Dakhiliyah registered a total of 16,281 enterprises within the wilayat with 92,047 workers and 32,061 establishments with 90,997 workers. During the engagement with the Wali of Adam on 14 July 2024, stakeholders confirmed that the population in the Project area depend on the sale of camels and jobs and service provision in the oil and gas sector. Stakeholders expressed specific interest and feedback regarding the significance of local value addition and the potential employment opportunities, albeit it limited, to be prioritized for the locals and companies registered in the wilayat.

6.3.11 LOCAL (AOI) LIVELIHOODS

The main livelihood and income generating activities in the area are agriculture, animal and livestock husbandry, small businesses and employment in the public and private sectors. The Wali of Adam described that the oil and gas sector in the area does provide opportunities for employment and contributes to the economy by procuring local services, however they are limited and do not necessarily prioritize local employment due to the employment system used (i.e., centralized employment platforms). No specific employment data is available for the settlements within the AoI although the Wali did confirm that primary sources of income

[7] The UNDP's GII measures achievements between women and men in three dimensions: reproductive health, empowerment and the labour market. It varies between zero (when women and men fare equally) and one (when men or women fare poorly compared to the other in all dimensions). The health dimension is measured by two indicators: maternal mortality ratio and the adolescent fertility rate. The empowerment dimension is also measured by two indicators: the share of parliamentary seats held by each sex and by secondary and higher education attainment levels. The labour dimension is measured by women's participation in the work force.

include selling camels and private sector jobs in oil and gas companies operating in the area.
Education

Based on the last UNESCO Country Report data, the percentage of literate population in the country increased from 86.9 percent in 2010 to 95.6 percent in 2018 as a result of the national policies for the promotion of education (UNESCO 2019). Despite these positive results, the percentage of illiterate women (7.3 percent) remains significantly higher than for men (3 percent) at national level.

6.3.12 LABOUR AND WORKING CONDITIONS

This section provides an overview of the labour and working conditions in Oman as evaluated in the 2024 Human Rights Risk Assessment (HRRA).

Oman's Labour Law, established under Royal Decree No. 53/2023, regulates various employment aspects, including minimum wage, working hours, overtime, rest periods, and leave entitlements, and introduces a wage protection system alongside reduced working hours. (for more details, see the Human Rights Risk Assessment report).

Oman's Basic Law guarantees equality for all citizens and prohibits gender-based discrimination (Human Rights Watch 2018). The Labour Law further regulates equality for workers under similar conditions (Article 23) and considers dismissals based on factors such as gender, race, religion, or pregnancy as arbitrary (Article 12). It also prohibits discriminatory job advertisements (Article 32), though it does not explicitly prohibit discrimination in areas such as access to employment or working conditions based on factors like race, gender, or nationality (US Department of State 2022). The law implies equal pay for men and women by mandating employer equality for its workers although it does not explicitly mention it or outline enforcement mechanisms. Most private sector employers reportedly observe these regulations (US Department of State 2023).

The Labour Law sets the minimum employment age at 15, with restrictions for minors (15-18) on night work, overtime, and hours exceeding six per day. Most employers require proof of basic education, implying most workers are at least 16. According to the US Department of Labour (2022), Oman has systems to enforce child labour laws, with the Ministry of Labour referring cases involving younger children to the Ministry of Social Development. The US Department of Labour (2022) also indicates that, despite limited research, there are signs that a small number of children in Oman may be engaged in child labour, specifically in activities such as fishing and farming.

A significant portion of Oman's workforce is made up of non-Omanis. The Labour Law requires employers to obtain authorization from the Ministry and work permits for hiring non-Omani workers. Similar to many other countries in the Gulf region, Oman uses the kafala system, where migrant workers' legal status is tied to their employer. If misused, this system can lead to exploitation, including underpayment, long hours, poor living conditions, and abuse (Human Rights Watch 2021). Some documented cases of extreme exploitation in Oman include unpaid wages and withheld passports (Fanack 2023; US Department of State 2022) (for more information, see the Human Rights Risk Assessment report). Recent reforms in 2023 prohibit employers from retaining workers' passports without their consent.

The Labour Law prohibits forced labour, however, it does not clearly define what constitutes "forced" or "compulsory" labour, which can potentially leave ambiguities in enforcement.

Occupational health and safety (OHS) regulations require employers to ensure a safe work environment, though comprehensive statistics on OHS compliance are not openly available.

Oman mandates employment quotas for persons with disabilities in both public and private sectors. However, enforcement of these quotas is reportedly inconsistent according to the US Department of State (2022).

Oman does not have specific legislation addressing workplace harassment; however, existing penal provisions may apply in such cases (for more information, see the Human Rights Risk Assessment report).

Overall, while Oman has made strides in aligning its Labour Law with international standards, significant challenges still remain in areas such as migrant worker protections, gender equality, and enforcement of labour rights in order to ensure alignment with international standards.

6.3.13 EDUCATION SYSTEM AND ATTAINMENT

The Oman education system is divided into the following levels:

- Pre-school
- Basic Education: including Grades 1-4 (Cycle 1) and Grades 5-10 (Cycle 2)
- Secondary Education: including Grades 11-12
- Tertiary Education

Educational infrastructure in Oman includes public and private pre-school, primary and secondary school and higher education (colleges, universities and training institutions) In 2020, Oman had 66 higher education facilities with 120,600 students enrolled, approximately 127,500 were enrolled in primary and secondary education (NCSI, 2024).

In Ad Dakhiliyah, there were approximately 291 primary and secondary schools (160 government and 131 private), hosting 123,094 students in 2022/2023 (NCSI 2023). There are no schools in the Project's social AoI. Residents in the Project area, including Abu Thayla, typically access the Government primary and secondary school in Ghabah. Opportunities for further education are available in tertiary colleges located in Adam, but residents can also access colleges and universities throughout Oman.

6.3.14 COMMUNITY HEALTH AND WELLBEING

6.3.14.1 HEALTH OVERVIEW

This section considers the leading causes of death and three key health indicators (maternal death rate, under-five death rate, and life expectancy) as a measure of over-all population health. It then gives more detail relating to the major causes of mortality in Oman, by communicable disease, chronic disease, non-communicable disease and accidents. A major finding is that the majority of the top ten causes of death and disability are due to non-communicable (i.e., chronic) diseases.

According to UNICEF (2023), government initiatives to enhance the quality of healthcare services have led to a significant reduction in the maternal mortality rate, which dropped to 17.2 per 100,000 live births in 2022 from 49.7 in 2021. However, despite maintaining universal vaccination coverage for both boys and girls, the infant mortality rate increased from 8.1 deaths per 1,000 live births in 2021 to 8.8 in 2022. Similarly, the under-five mortality rate rose from 10.2 deaths per 1,000 live births to 11.4 deaths per 1,000 during the same period.

Oman saw a significant rise in life expectancy at birth, increasing by 3.41 years from 69.1 years in 2000 to 72.5 years in 2021. This trend aligns with the Eastern Mediterranean region, which also experienced an improvement, with life expectancy growing by 3.47 years from 65 years in 2000 to 68.5 years in 2021(WHO 2024).

According to 2019 data from the Global Burden of Disease Collaborative Network (Elmusharaf et al 2023), Oman has seen a significant shift in its disease burden over the past 30 years, with non-communicable diseases (NCDs) becoming the predominant cause. In 1990, NCDs accounted for 48 percent of the total disease burden measured in disability-adjusted life-years (DALYs), but this figure has since risen to 68 percent. The remaining burden is attributed to injuries (20 percent) and communicable, maternal, neonatal, and nutritional diseases (12 percent).

NCDs have also emerged as the leading cause of death in Oman. According to 2019 data, they account for approximately 80 percent of all deaths in the country (WHO, 2024). By 2021, the four major NCDs—cardiovascular diseases, diabetes, cancer, and chronic respiratory diseases—were responsible for 72 percent of all mortality in Oman, with 18 percent of these deaths occurring prematurely in individuals aged 30 to 69 years (Oman Observer 2021) .

Non-communicable diseases

The non-communicable diseases, at national level, have decreased from 50.6 percent in 2020 to 48.5 percent in 2021. Diseases of respiratory system have increased to 14 (2.6 percent) per 10,000 population in 2021 from 9 (1.9 percent) in 2020 but have slightly declined compared to 18 (2.5 percent) in 2019. The same trend is seen between 2021 and 2020 for neoplasm, diseases of the nervous system, circulatory system, digestive system, diseases of skin and subcutaneous tissue and congenital anomalies.

Cardiovascular Diseases

Cardiovascular diseases are the leading cause of death globally (31 percent of all mortality) and in Oman (32.5 percent of hospital deaths in 2012), with a prediction of increasing incidence in future which is being driven by an increasingly aging population, and similar trends in smoking, hypertension, diabetes and obesity. Al Mawali and co-authors (2023) analyzed 2500 Omani cases of cardiovascular disease and found that 68 percent were low risk 19 percent moderate and 13 percent were high risk, with 30 percent needing immediate pharmacotherapy. Factors significantly associated with elevated risk were age, education level, and employment status.

Diabetes

Diabetes mellitus (DM) was the fourth largest cause of death in Oman in 2017. The average incidence of DM globally is 8.5 percent, but incidence in Omani is above the global average at 14.5 percent in 2017 (Al Rashdi & Al Mawali, 2021). The prevalence of diabetes in 2021 was 15.7 percent, rising from 12.30 percent in 2020.

Cancer

Cancer rates in Oman are approximately half that of the global cancer incident rate 105 per 100,000 for males and 96 per 100,000 for females, likely due to the young average age of the Omani population (Al-Lawati et al 2019a). For Omani females, thyroid and breast cancers are the most prevalent, accounting for over 30 percent of all cancers, while in Omani men,

prostate, colorectal and stomach cancers are most common, and account for around 23 percent of cancers. In another paper, Lawati et al. (2019b) described the incidents of lung cancer from 1996 – 2015 with incident rates of 8.2 per 100,000 for males and 2.6 per 100,000 for females. The authors attributed the lung cancer incidence rate, one of the lowest in the world, to a low uptake of tobacco smoking among both sexes.

Chronic Respiratory Diseases

There is limited information relating to the distribution of pulmonary disease in Oman (Al Jabri., et al., 2022). In their study, Al Jabri et al, (2022) analyzed 1120 pulmonary function tests conducted in a tertiary hospital in Oman. Of the patients with conclusive outcomes, 40 percent had normal findings, 26 percent had obstructive defects, 19 percent had restrictive defects, and 10.6 percent had both obstructive and restrictive defects. The majority of pulmonary disease is caused by lung infections such as Influenza A (H1N1). Lawati et al.'s (2010) study of 'flu' patients at the Royal Hospital during the 2009 epidemic found that 6.9 percent of patients admitted to hospital with flu died, even though the majority were admitted to intensive care units for treatment.

Communicable Diseases

According to data from the 2023 Statistical Year Book by the NCSI, in 2022, Oman saw significant changes in the reported cases of several notifiable infectious diseases compared to 2021. The most dramatic increase was observed in dengue cases, which surged from 24 cases in 2021 to 1,989 cases in 2022, marking an astonishing 8,187.5 percent increase. Acute haemorrhagic fever syndrome also saw a substantial rise, with cases jumping from 124 in 2021 to 1,996 in 2022, an increase of 1,510.5 percent.

Crimean Congo Haemorrhagic Fever (CCHF) cases increased from 2 to 7, reflecting a 250 percent rise. In Oman, CCHF was first identified in 1995 (Ministry of Health, 2017). Since then, sporadic cases have been reported across various regions of the country. Surveys and observations by the Ministry of Agriculture and Fisheries indicate that CCHF virus infection is prevalent among domestic animals such as goats, cattle, and camels, suggesting the virus is endemic in Oman (Ministry of Health, 2017).

Malaria cases rose from 172 in 2021 to 259 in 2022, representing an increase of 50.6 percent. Pulmonary tuberculosis saw a more modest increase, with cases rising from 233 in 2021 to 311 in 2022, an increase of 33.5 percent. However, this represents a 1.0 percent decrease compared to the 314 cases reported in 2020.

Conversely, COVID-19 cases decreased significantly, dropping from 176,686 cases in 2021 to 93,633 in 2022, marking a decrease of 47.0 percent.

Regarding viral hepatitis, the number of reported cases decreased from 125 in 2021 to 90 in 2022, reflecting a decrease of 28.0 percent. This decline also continues a long-term decreasing trend, with cases falling from 1,628 in 2017, representing a significant decrease of 94.5 percent between 2017 and 2022 (2022 Annual Health Report by the Ministry of Health).

HIV/AIDS cases slightly decreased to 201 in 2022 from 202 in 2021, reflecting a minimal decrease of 0.5 percent. However, this is a continuation of a significant increase from 147 cases in 2020, where the rate had risen by 37.4 percent. In 2021, 84 percent of the recorded cases affected males compared to 80 percent in 2020 (ERM, 2023). The number of new HIV infections per 100,000 uninfected population in 2021 was two for women (stable compared to

2020 but dropping from three in 2016 to 2019) and seven for men (increasing from five in 2020, and six in 2017-2019) (ERM, 2023).

Brucellosis cases experienced a significant rise in 2022, reaching 195. This represents a notable 62.5 percent increase from 120 cases in 2021. This upward trend is a reversal from the previous decrease of 7.7 percent from 130 cases in 2020, highlighting a substantial rebound.

Bacterial meningitis cases continued to increase, reaching 155 in 2022, which is a 15.7 percent rise from 134 cases in 2021. This follows a larger increase from 71 cases in 2020, marking an overall upward trend over the past few years.

MERS-CoV, which had no reported cases in 2020 or 2021, reported 1 case in 2022, indicating a new occurrence of this disease.

Pneumococcal invasive disease cases also saw a significant increase, rising to 21 in 2022 from 11 in 2021, reflecting an 81.8 percent rise. This continues the upward trend from having no cases in 2020

According to data from the 2022 Annual Health Report by the Ministry of Health, in 2022, airborne infections represented the majority of outpatient morbidity cases related to communicable diseases in Minister of Health institutions across Oman. Nationally, out of a total of 5,906 reported cases of communicable diseases, 5,312 cases (or 89.9 percent) were due to airborne infections. Contaminated hands, food, and water accounted for 348 cases (5.9 percent), while 246 cases (4.2 percent) fell under the "Others" category.

In Ad Dahkliyah, the pattern was consistent, with airborne infections making up 90.1 percent (5,892 cases) of the 6,541 total communicable disease cases. Cases from contaminated hands, food, and water stood at 399 (6.1 percent), while 250 cases (3.8 percent) were listed under "Others."

In 2022, Oman recorded a total of 597 deaths in Minister of Health hospitals due to infectious and parasitic diseases, a significant decrease from the 2,691 deaths reported in 2021 (2022 Statistical Year Book by the NCSI). Among these, Ad Dahkliyah reported 97 deaths (down from 211 in 2021), accounting for 16.2 percent of the national total. Mortality rates in Ad Dahkliyah were significantly lower compared to Al Batinah North, which had the highest mortality rate, representing 29.8 percent of the national total.

For diseases of the respiratory system, the national total was 798 deaths in 2022, an increase from the 635 reported in 2021. Ad Dahkliyah recorded 97 deaths in 2022, a notable decrease from the 165 deaths recorded in 2021, representing 12.2 percent of the total.

Accidents and Injuries

Physical harm can be caused by either unintentional or intentional injury. Unintentional injuries, or death, typically results from accidents that occur during transport, at the workplace or at home, or during leisure time activities. Intentional injuries are defined as being caused by interpersonal violence (assault) and self-harm.

According to the 2021, Annual Health Report released by the National Centre for Statistics and Information in 2022, the death rate due to road traffic injuries was 9.6 per 100,000 population, decreasing from 15.7 in 2016 and 11.0 in 2019 but increasing compared to 8.1 in

2020. In 2022, 270 traffic accidents in Ad Dakhiliyah were registered coming second after Muscat that registered the highest; 398 accidents.

According to the Oman Observer (article dated August 2024, based on NCSI statistics),, excessive speed was the biggest cause of accidents in the country, while other causes of accidents include misconduct while driving, negligence, failure to leave appropriate safe distance between vehicles, misjudged overtaking, and vehicle defects.

Community Safety and Security

Any new infrastructure project may have to potential to raise safety and security concerns for nearby communities. These issues may arise from opposition to the project, community concerns about its environmental and social impacts, or perceived threats to local livelihoods. Tensions can escalate when communities engage with the project's security measures, particularly if they view them as excessive or aggressive. This interaction can result in conflicts, distrust, and, in extreme isolated cases, violence between project stakeholders and local residents.

In Oman, concerns about the use of force by the Royal Oman Police have been highlighted, particularly in connection with the 2011 Sohar protests. However, recent demonstrations in support of Palestine in late 2023 were not disrupted by security forces. Additionally, there is no known history of community opposition to renewable energy projects in Oman, likely because the country offers vast, open spaces for such developments, minimizing the risk of community disturbance.

Furthermore, within PDO concession operations, night-time driving is prohibited unless approved by the Operator, regardless of the location within the Sultanate. "Night-time driving" is defined as any driving between 15 minutes before sunset to 15 minutes after sunrise. This policy reduces potential interactions between PDO and contractors' personnel and local communities, thereby lowering the risk of safety and security concerns for nearby communities.

Workplace Health and Safety

Another significant cause of injury is work in the oil and gas sector. Al Rubaee & Al Maniri (2011) analyzed non-fatal work injuries in Harweel from April 2007 to December 2009. During that period there were 170 work-related injuries, with an average injury rate of 19.8 per 1000 exposed workers per year. The most common injuries were foreign body to the eye and slips and falls, which together accounted for 39 percent of incidents, the majority of which (52 percent) affected workers aged 30 years or less.

6.3.14.2 HEALTHCARE INFRASTRUCTURE, ACCESSIBILITY AND QUALITY

In Oman, the health service is divided into three levels: primary, secondary, and tertiary. The primary level is represented by regional health centers and local hospitals, the secondary level comprises regional and district hospitals, and the tertiary level refers to the eight national hospitals. Oman has prioritized financial access to primary health care. The Health Ministry offers free universal health care to all Omani nationals and expatriates working in the government sector, including access to mental health services and associated medicines. The expatriate workforce in the private sector is required to provide adequate healthcare through employer-provided insurance.

The Project AoI has a low population density and there is one permanent active settlement in the Project AoI, Abu Thaylah, although small settlements are present outside of the AoI, such as Ghabah (26.5 km to the south-east of the Project site), and Qarat Al Milh (39 km to the north-east). No public and civil services (clinics, hospitals, schools, public buildings and services) are located in the AoI and are only available in the settlements and PDO camps a little distance outside the AoI.

The nearest Government hospital to the Project site is in Adam, 110 km to the north-west. The hospital, established in 1978, currently has 30 beds: six for obstetrics, 11 for pediatrics, and 13 for general medicine. In 2022, the occupancy rate was 41 percent. In the same year, there were 108,000 hospital visits, 75,000 of which were for general practice medicine, 13,000 for child medicine and immunization and 5,300 for natal care. The medical staff at Adam hospital comprises 24 doctors and 70 nurses, with the total staff, including administration, reaching 175.

Ghabah, 26 km to the east of the Project site, hosts a government health center which opened in 2014, and would be the most likely facility that emergency cases would be taken to in case of an accident occurring in the AoI. PDO also operates a clinic at Qarn Alam to service the demand for healthcare, with urgent cases being referred on to the Government health service. If an accident occurred out of working hours, cases would likely be taken to the PDO clinic to be stabilized since it is operational 24 hours a day.

During engagement with PDO on 23 July 2024, it was confirmed that clinics with first responder and first aid capability are located at the PDO camp at Qarn Alam and mostly cater to the occupational health needs of PDO employees, although PDO personnel confirmed that they occasionally treat community members, particularly when public health facilities are closed. Clinics can be accessed for any emergency case regardless of the situation. PDO contractors are required to set up their own medical facilities to treat their personnel.

6.3.14.3 DETERMINANTS OF HEALTH

Social Determinants of Health

Social and behavioral health risk factors relevant to this Project include poverty, hygiene, community sense of safety, and substance abuse. These factors are used in the impacts section to assess the vulnerability of a population to changes related to the influx of construction workers and operation of a new wind farm facility in the area.

The national-level mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene was 0.01 per 100,000 population in 2020 and 2021, declining from 0.02 in 2019 and 0.04 in 2017.

Approximately 6.3 percent Omani and 14.2 percent of expatriates smoked as of 2021; by sex, 15.8 percent of men (skewed by the expatriate demographic) and 0.5 percent of women in Oman leading to an average 8.5 percent of the overall population smoking. Approximately 26.6 percent of male teenagers and 3.6 percent of women teenagers smoked as of 2021, and approximately 6.6 percent of male teenagers and 2.2 percent of female teenagers consumed alcohol as of 2021.

Prevalence of obesity was 19.1 percent in total at national level in 2021, but it affected women more than men (15.6 percent male and 22.3 percent women). Contraceptive prevalence was 28 percent among urban women and 16 percent among rural women in 2021.

Environmental Determinants of Health

The national-level mortality rate attributed to household and ambient air pollution increased significantly over the since 2016 and was 17 per 100,000 population in 2021 compared to 14.1 in 2020, 11.9 in 2019, 10.9 in 2018 and 6.9 in 2016. See section on Chronic Respiratory Disease above for more details. There are few potential sources (power plant and flare stacks) of industrial air pollution in the AoI, and none that are located near permanent settlements other than PDO camps.

AOI Level

The only specific comment pertaining to community health was received during an informal meeting with the sheikh of Abu Thaylah who voiced his concern about the perceived health effects of emissions from the oil and has sector on residents of his village.

Stakeholders engaged at the Wali of Adam's office mentioned the hazards posed by road traffic, specifically referring to dust being a causal factor in traffic accidents on unpaved roads in the general Project area.

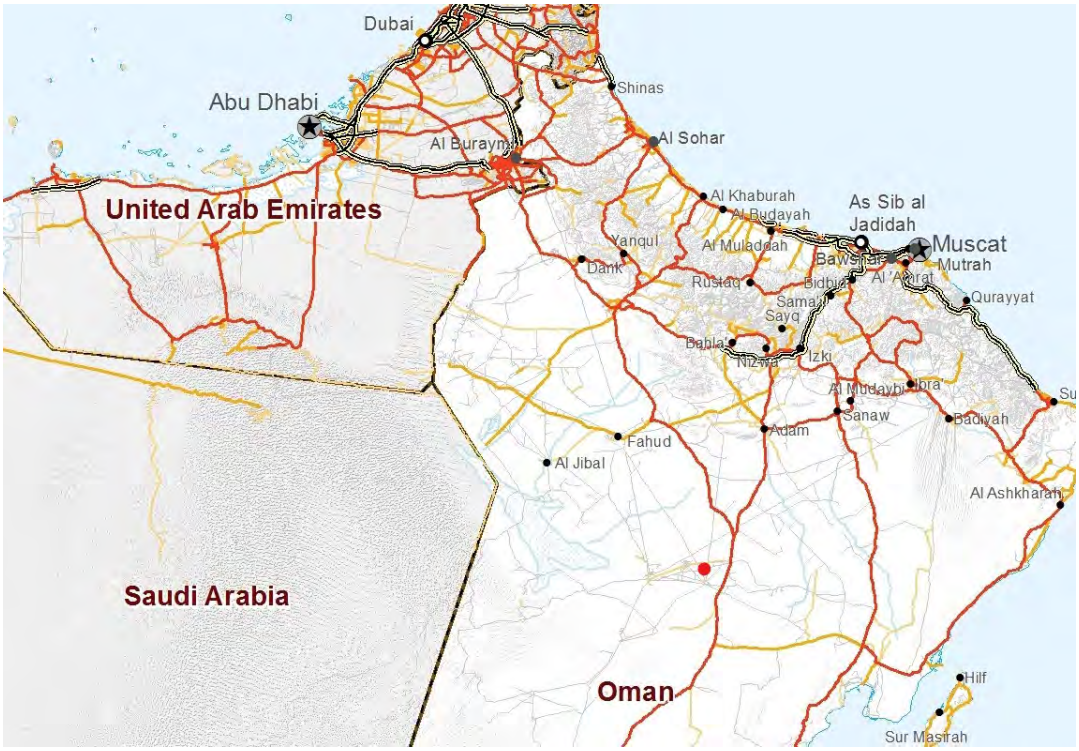
6.3.15 INFRASTRUCTURE AND PUBLIC SERVICES

6.3.15.1 ROADS AND TRANSPORT INFRASTRUCTURE

Oman's high average income, low population density, and the long distances between settlements have made the country heavily reliant on private vehicles and road transport for both passenger and freight travel (World Bank 2015). Oman has 64,000 km of roads connecting towns and villages, of which about 51 percent is paved (World Bank 2015).

Figure 6.52 shows the transportation infrastructure available in northern Oman.

FIGURE 6.52 ROAD INFRASTRUCTURE IN NORTHERN OMAN



Note: PV Project site indicated with red dot.

Source: Logistics Cluster, n.d.

The most common mode of transport between major population centers is by private cars. Rental car facilities are available in most towns, with many individuals also using their privately owned and licensed taxi as their private cars. There is a significant lack of public transport, particularly in rural areas but the public transport system was strengthened with the expansion of the Mwasalat bus fleet in 2015. Mwasalat operates an intercity service, which includes bus stops on Road 31, Adam, Ghabah and the Qarn Alam turnoff, the nearest of which is around 26 km from the Project site.

The highway connecting Muscat with Salalah (Route 31) passes through Adam and Ghabah and is the main road serving the area around Qarn Alam. From Route 31, the site is accessed through the PDO road network, comprising a single carriage way unpaved road system. There are two routes to access the site: the southern route entails 17 km From Ghabah to a roundabout and a further 13 km from the roundabout to the site. The northern route involves a journey of 34 km on a PDO road which joins Route 29 and it is another 4 km on Route 29 before the fly over with Route 31.

The nearest police station is located in Ghabah. Engagement with local government stakeholders (14 July 2024) revealed several issues relating to road traffic accidents. The first was the hazard posed to road users by camels straying on to main roads, which causes serious accidents and economic loss for the animal's owner. The second issue raised was dust being a contributing factor in traffic accidents on unpaved roads. A third issue was raised by the Omani Women's Association of Adam (14 July 2024) and refers to the lack of street lighting on some sections of road in the Wilayat.

6.3.15.2 WATER RESOURCES AND USE

Oman is located in an arid region – consequently access to renewable natural water resources is limited. Groundwater is the main water resource utilized in Oman for agricultural purposes, while desalination of seawater and brackish groundwater is the main source of water for urban and industrial consumption. Approximately 92 percent of the total water abstracted from groundwater in Oman is for agriculture use. Oman is now increasingly reliant on non-conventional water sources such as desalination, while some industrial process water draws on treated wastewater (TWW) as a source.

There are three springs in the Wilayat of Adam. Two of them, Rakhim and Jandali are located at the foot of Jabal (Mount) Salakh, and Nama is located on the banks of Wadi (valley) Halfain. There are four active aflaj (irrigation system which catches water from the mountains) crisscrossing Adam. Potable water is supplied to Abu Thaylah via tanker from government water distribution centers and stored on roof top tanks of each residence.

6.3.15.3 SANITATION

In Oman, 97 percent of households are reported to have access to improved sanitation facilities (95 percent amongst rural households and 100 percent amongst urban households) and 93 percent of the population have access to drinking water from improved sources (85 percent of the water from desalination plants and 15 percent from wells. Oman Wastewater Services Company SOAG, formerly Haya Water and a subsidiary of the Government owned Nama Group, is the entity responsible for wastewater management in the public domain throughout the majority of Oman. Its responsibilities are to develop, operate and maintain sewage treatment plants (STPs) and mains sewerage in urban centers, and smaller package

STPs in smaller rural communities. Smaller STPs are serviced by tankers that convey wastewater stored in septic tanks at the household. Residences at Abu Thaylah have septic tanks that are emptied periodically by wastewater tankers that convey waste to the nearest STP for treatment.

6.3.15.4 WASTE

Since 2009, Oman Environmental Service Holding Company S.A.O.C (Be'ah) is the entity responsible for solid waste management in the Sultanate of Oman as per Royal Decree No. 46/2009. A total of 2.52 million tonnes of waste was collected in 2021, by a fleet of 1,157 trucks. Illegal open dumping of waste remains a prevalent issue in the country, with over 300 dump sites operating until recently. However, ever since its establishment, through its strategy of controlling the damage of legacy practices, Be'ah has closed 200 traditional dump sites across the Sultanate, including the major dump sites at Shalim in 2019 and Adam in 2015 (Be'ah, 2020), with Thumrait dump site scheduled for rehabilitation in the near future (Be'ah, 2021).

All municipal waste is now received at 10 engineered landfills with one more currently under construction, and no municipal solid waste is received at dump sites. The process of taking dump site over from Municipalities is largely complete, but at some sites the transfer process is still in progress, including at Adam (see

Table 6-24). Key landfill sites are located at Thumrait (Dhofar), which received around 235,000 tonnes in 2021, and Duqm (Al Wusta), which received around 80,000 tonnes in 2021 (Be'ah, 2021).

To facilitate the movement of solid waste to landfill sites, Be'ah have constructed 14 transfer stations, with a further seven under construction in 2019. Currently 87 percent of Oman's population are provided with formal waste management services, including 100 percent of Al Wusta (54 tonnes generated per day), Dhofar (474 tonnes generated per day) and Dahkliyah (445 tonnes generated per day).

TABLE 6-24 SUMMARY OF WASTE INFRASTRUCTURE IN AD DAKHILIYAH

	Landfills	Transfer Stations	Dumpsites	Closed Dump Sites
Ad Dakhiliyah	1	6	43	8

Source: Be'ah 2019 Annual Report (2024)

For this Project, the nearest waste management facility is located in Qarn Alam at 22.7 km from the site and managed by PDO. The main dumpsite and transfer station of Wilayat Adam is at 105.5 km from the Project site. Additional local/ regional waste management sites are listed below:

Qarn Alam Sanitary Landfill – 22.6 km

Qarn Alam – 22.8 km

LNG Water Disposal Pond – 30.1 km

Al Zahiya – 63.7 km

Al Mahyuul – 75.6 km

Al Ghedhrana – 98.0 km

Ras Al Jabal – 103.0 km

Adam Main Dumpsite and Transfer Station – 105.5 km

Al Uqda – 108.4 km

Izz Landfill - 133.8 km

The operational status, remaining capacity, and suitability of the listed waste management facilities to receive Project waste must be confirmed prior to the start of construction activities. Be'ah industrial waste strategy is based on the development of integrated hazardous waste handling facilities in North Al Batinah (Sohar) and at Duqm. The facility at Duqm, developed jointly with SEZAD, became operational in 2019 and includes both a hazardous waste landfill site and a hazardous waste storage facility, receiving 81 tonnes in 2021 (Be'ah, 2021). Be'ah is assessing the hazardous waste management requirements of Dhofar with particular attention to the requirements of the oil and gas sector.

Be'ah also has longer term strategies in place to reduce waste generation to less than 1 kg per person per day (from 1.2 kg pp per day) by 2040, to develop a novel reuse center, to commercialize waste streams to enable recycling (e.g., waste trading platform), and generate energy from waste (e.g., end of life tyres as fuel for cement production). Recycling initiatives are focused on plastic, construction and demolition waste, end of life tyres, green waste, lead acid batteries, waste electrical and electronic equipment (WEEE), metal scrap, and end of life vehicles. Other development initiatives include legislation review to enable recycling and enhancing waste import regulations (completed in 2021), improving QHSE standards and practices, development of an environmental center of excellence and working with youth to change mindsets and find creative solutions in the waste management sector.

The July meeting with the Wali of Adam brought to the forefront that there are existing issues with waste management facilities in the area, referring to the simple dump sites that operated in Oman for many years before a formal system of engineered landfills and transfer stations were developed. The legacy dump sites pose a human health hazard and environmental liability, and Be'ah are delivering a programme of reinstating legacy dump sites across the country.

6.3.15.5 ENERGY

Oman depends largely on diesel and natural gas, and to a less degree on diesel, for most of its energy requirements, with a target of 30 percent of its electricity being generated from renewable sources by 2030, as part of Oman Vision 2040. Installed renewable energy capacity is growing with two large solar farms now online: 500 MW Ibri II and 500 MW Manah 1, with an additional 500 MW planned from Manah II. These projects are located in the Governorate of Ad Dakhiliyah. With recent liberalization of the Energy Law power intensive industries are able to purchase renewable energy for their exclusive consumption, so called 'tied facilities'. Examples of this model being executed in Oman include solar power farms supplying a ferro-chrome smelter in Sohar, and a desalination plant in Sur.

Electrical energy is transmitted and distributed via three main grids: most relevant to the Project is the main interconnected system (MIS), which serves the majority of demand in Northern Oman, and the PDO grid which is largely responsible for distribution of power to PDO's operations. Rural communities are served by mini-grids owned and operated by the

Rural Areas Electricity Company (RAECO), generally generating power from diesel generators, renewable energy or hybrid systems. Oman Electrical Transmission Company, a subsidiary of the Nama group, is currently delivering Phase 1 of the connection project which will connect the MIS to the Dhofar Power System, the alignment of which passes through Saih Nihaydah in the Project AoI.The alignment of the subsequent phases of the connection project and their proximity to the Project site are currently unknown.

As reported by the Sheikh of Abu Thaylah, the village's electrical power supply is unreliable, although no further details were provided concerning the cause of outages.

6.3.16 CULTURAL HERITAGE

This chapter presents the baseline for cultural heritage and assesses the nature, distribution, and value (significance) of identified cultural heritage resources for the PV Project Project in Oman.

The Sultanate of Oman has always been a junction of the trade routes linking the Far East, Eastern Africa and Europe. As an old seafaring nation, Oman has taken part in the cultural and economic exchange among many nations. Because of its position on one of the oldest trade routes, the legendary silk road, the country possesses a rich archaeological and architectural heritage. Based on desk research, stakeholders feedback from meetings on 14 July, 2024, and a field survey for cultural heritage, it has been concluded that there are no notable heritage sites within the Project AoI that are known to key stakeholders.

Whilst no archaeology has been noted on the site, an understanding of the regional context is necessary. Regional archaeological information is typically limited to the southern Rubh Al Khali and predominantly pertains to Neolithic chipped stone tools in Ramlat Fasad; far to the south, outside the Project AoI, on the southern dune front of the Rubh al Khali.

A single trilith has been identified in the vicinity of Adam, dating back to the Late Iron Age and associated with a distinct culture that extended to Southern Arabia. Triliths are thought to define a prehistoric culture that existed in southern Arabia during the Iron Age, and the trilith found in Adam represents the northern most limit of this culture. Many of the other archaeological features in the area around Adam date from the Islamic Age.

6.3.16.1 AREA OF INFLUENCE FOR CULTURAL HERITAGE

The Project AoI for cultural heritage includes the Project site and the surrounding area where potential direct impacts on cultural heritage are expected to occur. The cultural heritage AoI has been defined to include a 2 km radius around the Noth Oman Solar Project site.

Archaeology

This section summarizes geological and archaeological heritage sensitivities around the Qarn Alam Solar Farm development zone. During the 2003-2004 Central Oman Pleistocene Research campaign (Rose, 2006), an area encompassing the Project site area was surveyed for prehistoric stone tool scatters and stone monuments. The results of this campaign were reviewed in relation to the Project site. Table 6-25 and Figure 6.54 present the findspots from this campaign (Rose, 2006). None of the findspots fall within the cultural heritage AOI (2 km)

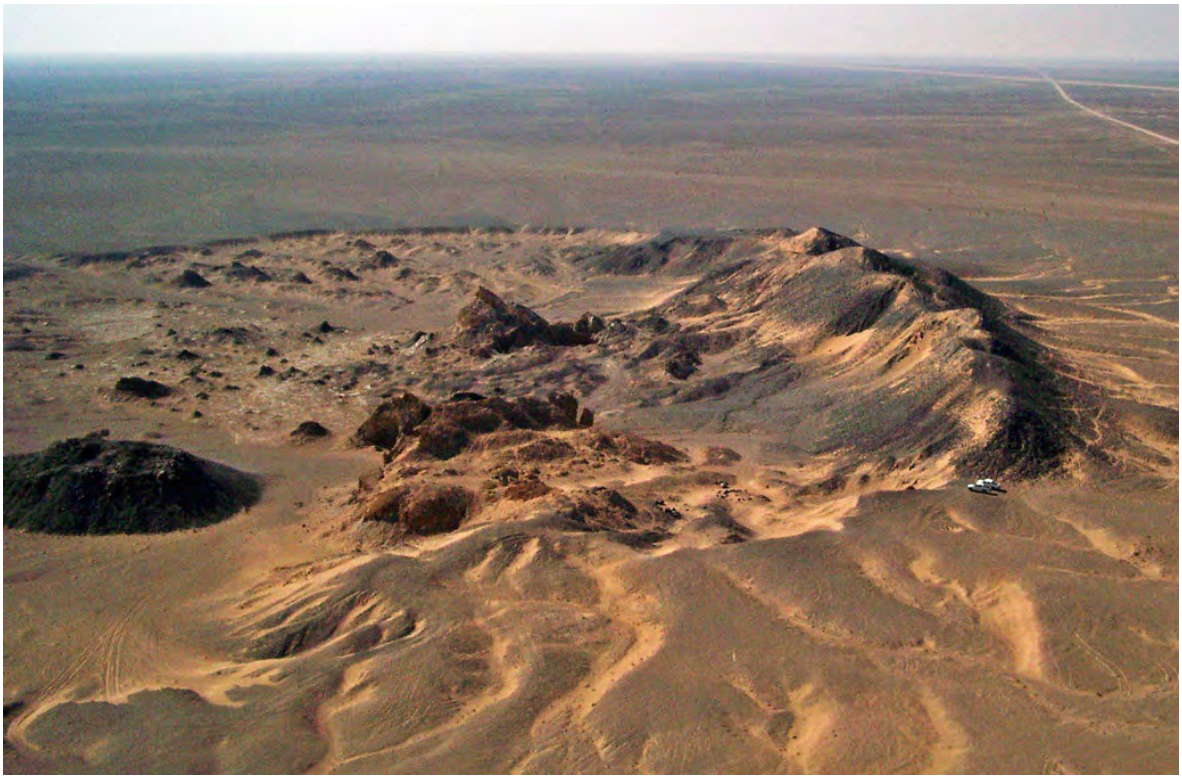
Geological Setting

The Qarn Alam is located on an extensive bajada plain abutting the Hajar mountain piedmont on its southern flank. The plain is interlaced by a dense network of anastomosing drainage

systems dipping southward. The landscape displays little relief, for the most part, declining from 230 m in the north to approximately 100 m in the south (Roger et al., 1992). The bajada plain consists of superimposed alluvial mega-fans that were deposited throughout the Quaternary, accumulating during periods of intensified precipitation. In human evolutionary terms, this is an incipient period of modern human dispersal through the interior of Oman, therefore, of high scientific value.

The terraces that characterise much of the landscape are comprised of reworked fluvial gravels. Clasts are well rounded and range from small pebbles to large cobbles, including fine-grained chert and radiolarian nodules with positive flaking properties conducive to stone tool manufacture. The latter are derived from the Barzaman foundation, a Miocene-Pliocene conglomerate that outcrops around 25 km to the south of the project site. The area around the Project AoI is a flat gravel plain, intersected by wadi beds with fluvial terraces, in which a series of diapirs outcrop reaching up to 50 m in elevation, formed by salt tectonics, the closest of which to the Project site are the Kibrit Diapir (13 km to the east of the site, outside of the AoI; see Figure 6.53) and the Qarn Alam Diapir (23 km to the southeast of the site, outside the AOI). The diapirs provide the only vertical relief on an otherwise flat plain.

FIGURE 6.53 AERIAL VIEW OF THE QARAT AL KIBRIT DIAPIR



Source: Rose 2006

The location of the Kibrit Diapir is presented in Figure 6.54

Archaeological Sites

Of the eight known archaeological sites in an area of 50 km around the project boundary, most were found within and around these diapirs. Surface finds at these sites include a range of discarded chipping debris, as well as diagnostic Neolithic arrowheads in the early stages of manufacture. None of the eight findspots are within the 2 km Cultural AoI (see Table 6-25 and Figure 6.54).

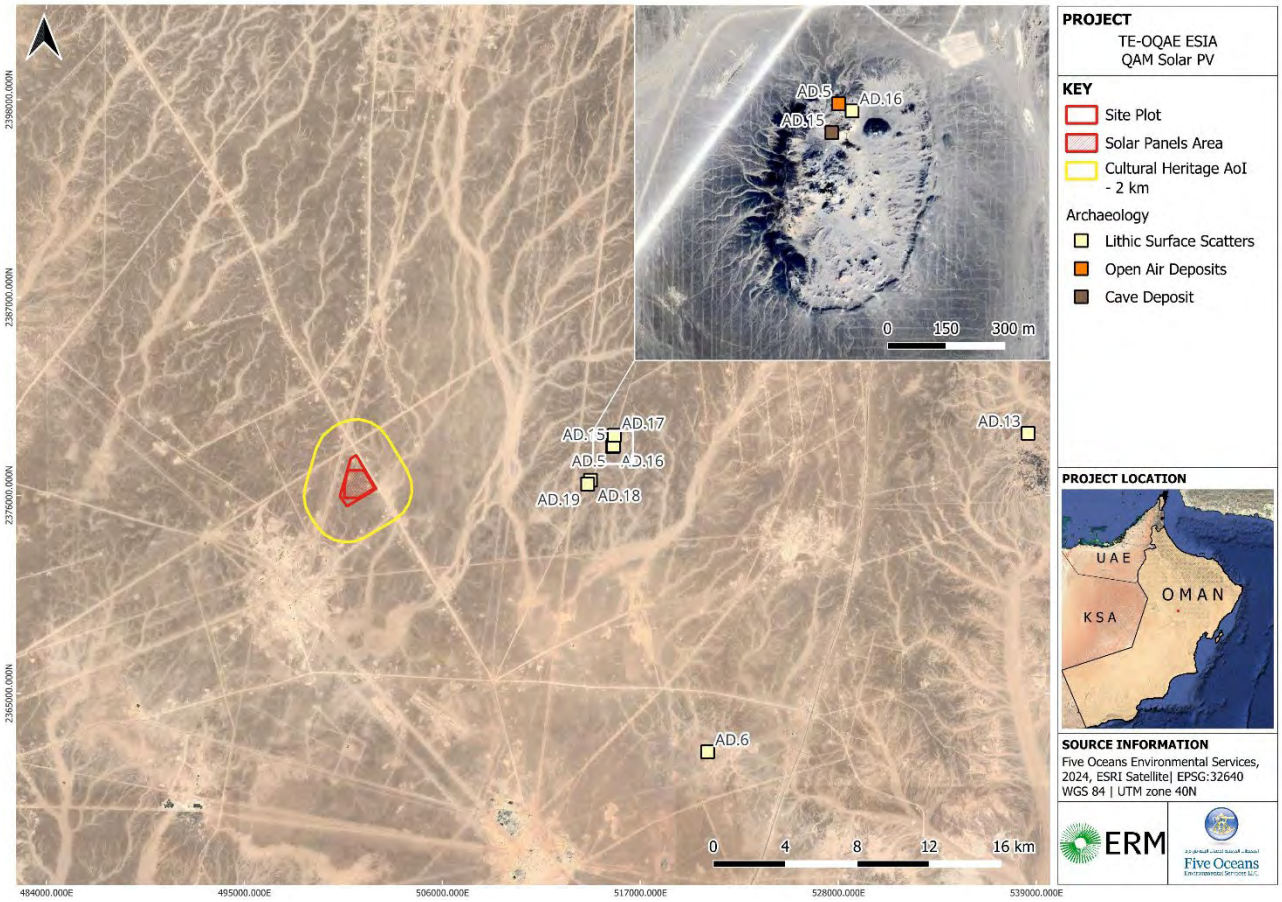
The stratified archaeological site of AD.5 at the Qarat al Kibrit salt dome, 13 km east of the Project site was excavated in 2004 (Rose et al., 2011). The upper stratum of the site is radiocarbon dated to 2,945 ± 250 years before present, placing it in the Early Bronze Age. The lower levels, although undated, produced arrowheads diagnostic of the Neolithic time period (Figure 6.55), bracketing the entire period of occupation of AD.5 between the 6th and 3rd millennia BC.

TABLE 6-25 LOCATIONS OF ARCHAEOLOGICAL FINDSPOTS IN THE PROJECT SITE VICINITY (ROSE, 2006)

Code	Site Type	Landscape	Latitude	Longitude	Elevation (m asl)	In/Out2 km AOI	Distance from Project Boundary (km)
AD.5	Open-air deposit	Diapir	21.511	57.149	152	Out	13.39 km
AD.6	Lithic surface scatter	Diapir	21.357	57.200	171	Out	23.51 km
AD.13	Lithic surface scatter	Diapir	21.517	57.372	154	Out	36.37 km
AD.15	Cave deposit	Diapir	21.511	57.149	153	Out	13.36 km
AD.16	Lithic surface scatter	Diapir	21.511	57.149	150	Out	13.42 km
AD.17	Lithic surface scatter	Diapir	21.516	57.150	159	Out	13.57 km
AD.18	Lithic surface scatter	Fluvial terrace	21.494	57.137	142	Out	11.91 km
AD.19	Lithic surface scatter	Fluvial terrace	21.492	57.135	150	Out	11.76 km

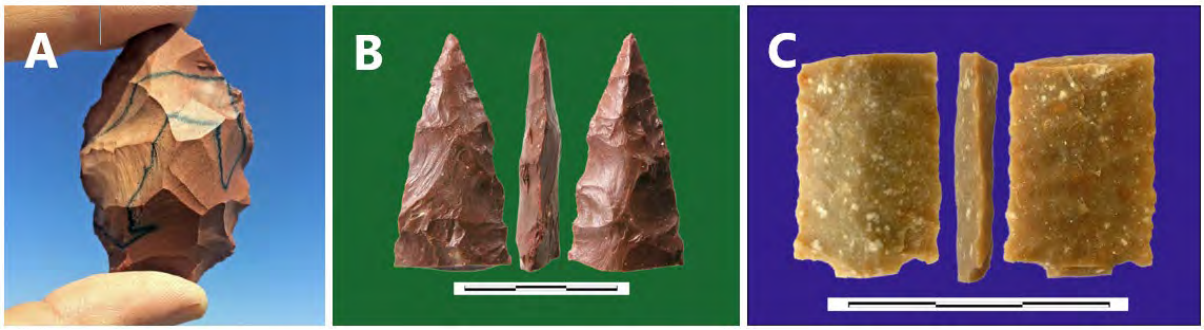
Source: 5OES, 2024

FIGURE 6.54 MAP OF FINDSPOTS WITHIN 15 KM OF THE PROJECT BOUNDARY



Note: None of the findspots fall within the heritage AoI (2 km). Source: Rose, 2006.

FIGURE 6.55 REPRESENTATIVE LITHICS FROM FINDSPOTS IN THE PROJECT REGION



A: Bifacial armature pre-form manufactured on radiolarian, from findspot AD.13. B: Neolithic arrowhead fragment manufactured on radiolarian, excavated from layer 2 of site AD.5. C: Neolithic arrowhead fragment manufactured on chert, excavated from layer 3 of site AD.5.

Source: Rose (2006)

Walk over surveys within the Project boundary conducted in May 2024 did not yield any evidence that lithics (stone tools and debitage) are present on site.

Summary

During a 2003-2004 archaeological survey of the area around the Project site, a total of eight archaeological findspots were mapped, consisting solely of lithic tools and debitage. These

were predominantly found in diapirs (eroding emergent salt domes), and on fluvial terraces where siliceous raw materials (chert and radiolarian silica) are available. Given this pattern of archaeological site distribution, there is some possibility of lithic manufacturing debris located on terraces on site, however any surface scatters are not likely to be of high scientific value, in part because they are not present in a stratified setting and therefore cannot be dated. Walk over surveys did not find any lithic. The Project site and its cultural AoI therefore is considered to be of very low archaeological sensitivity, as confirmed through desktop research and stakeholder feedback.

6.3.16.2 CULTURAL UNIQUENESS

The Project site is located around 100 km from the historic town of Adam, the Governorate capital of Ad Dakhiliyah. Ad Dakhiliyah has a significant history as it was the seat of the imamate in Oman prior to complete independence from the British and ruling under the Sultan.

It is said that the name of Adam comes from “Adim Al Ardth” (the surface of the earth), while others say it refers to as “the fertile land which is located in the middle of the desert.” The city houses Harrat Al Jami, which is made of two-storied mud buildings, in which the house of Imam Ahmed bin Said Busaidi (1744-1783), the founder of the Al Busaidi dynasty, stand as a reminder of his resolve to unite the country. The late ruler, Sultan Qaboos bin Said, was the seventh descendant of Imam Ahmed bin Said Al Busaidi.
Traces of the old Oman can still be found in Adam. Some temporary houses made of palm fronds, a regular feature of days gone by, are seen at several places in Adam. During the summertime, people from places such as Duqm and Haima come to Adam for date cultivation and spend their time in these houses. The traditional industries and occupations in Adam are working with gold and silver, iron works, weaving palm leaves, wool weaving, bee keeping and making Omani sweets.

Although Abu Thaylah was not registered in the 1993 census, it was registered in the 2010 census to have 36 houses with only 13 occupied, the total inhabitants were 394 of which at the time 87 percent were expatriate (95 percent male), indicating that the possible reason for living there was mainly to serve development or oil and gas projects or to support in raising livestock. The people of Abu Thaylah travel to the UAE and have familial relations living and moving across the border.

7. IMPACT ASSESSMENT

7.1 OVERVIEW

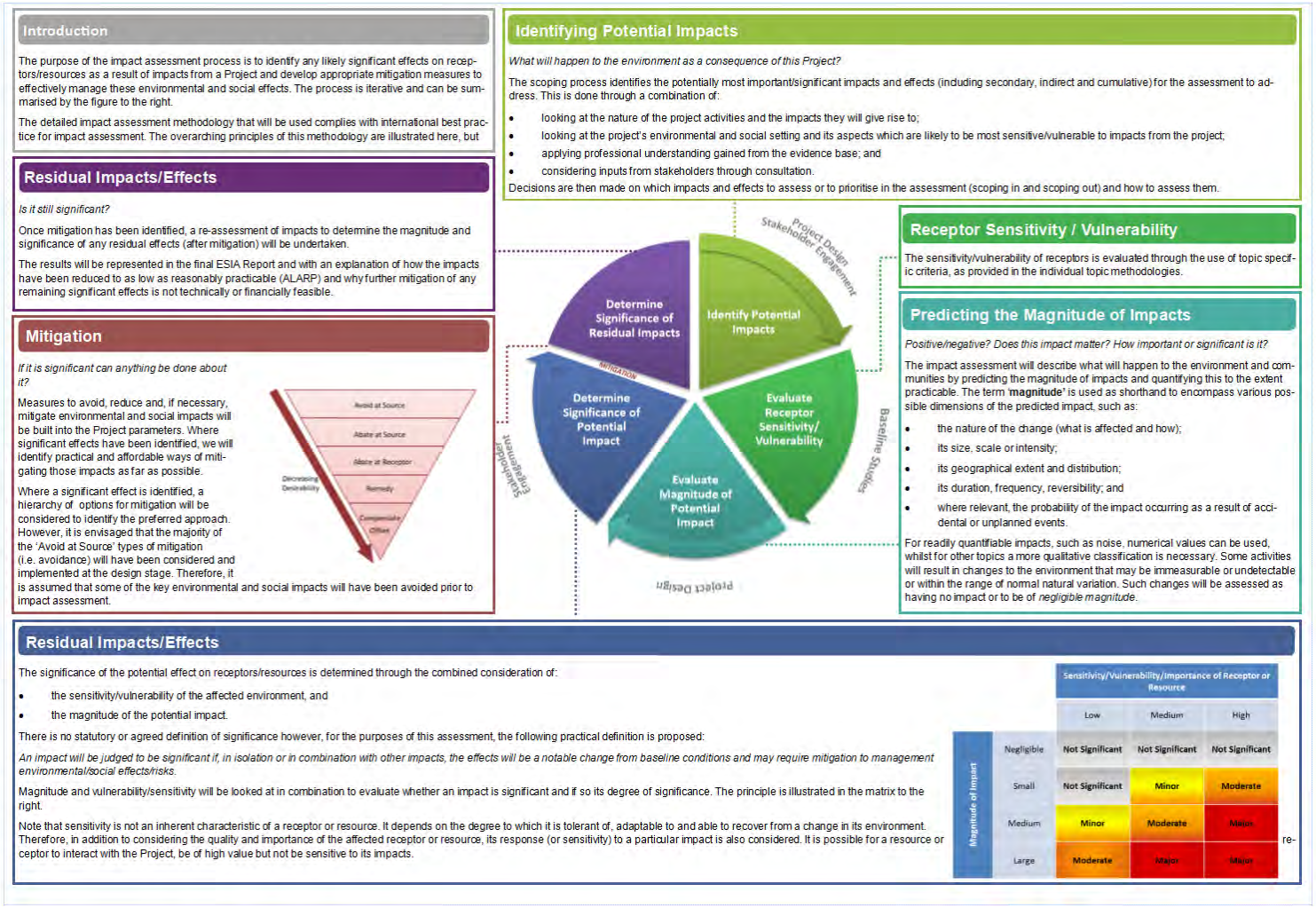
This section provides an assessment of the potential environmental and social impacts that may result from the Project and provides details of the mitigation measures and management actions that will be implemented to avoid, reduce, remedy, or compensate for significant adverse impacts and, where practicable, to maximise potential positive benefits and opportunities from the Project. The objectives and legal basis for environmental and social assessment in Oman are described in Section 1 and Section 2, respectively.

The approach adopted for the ESIA was to identify and assess the impacts that are likely to be significant and those impacts that are not likely to be significant are excluded (Aspects scoped out are presented in Section 7.3) from the assessment.

The overarching impact assessment methodology used for this ESIA is presented in Figure 7.1 and provides an explanation of the components of the assessment process and how the significance of potential impacts is evaluated.

The mitigation measures proposed throughout the document are based on the knowledge of ERM/5OES experts and take into consideration 1) international best practice/project international standards, 2) the mitigation measures proposed in the **local ESIA** (June 2024) and 3) the **EA's Local permit conditions** (October 2024). It is noteworthy that there was an initial set of permit conditions issued by EA in July 2024 after the approval of the Local ESIA A; however, some of these were discussed due to potential inapplicability, between the Project Proponent and EA on 23rd September 2024; being the final version of these permit conditions issued in 17th October 2024. Appendix B includes a copy of the EA’s Local Environmental Permit and permit conditions.

FIGURE 7.1 OVERARCHING ASSESSMENT METHODOLOGY



Source: ERM 2018

Where there is uncertainty in the assessment process, a precautionary approach is used and potential impacts are included and assessed. Therefore, there will be potential impacts included in the assessment that are ultimately judged to be Not Significant.

The following subsections will assess the identified environmental and social impacts and the subsection 7.5.5 Climate Change will provide an assessment of the physical risks due to climate hazards.

7.2 ASSESSMENT METHODOLOGY

The general impact assessment methodology is outlined in the following section, along with definitions for magnitude of impact.

7.2.1 PREDICTING THE MAGNITUDE OF IMPACTS

Prediction of impacts is an objective exercise to determine what could potentially happen (both adverse and positive) to the environment as a consequence of the Project activities. This is a repeat of the process undertaken in scoping, whereby the potential interactions between the Project and the baseline environment are identified. In the impact assessment stage, these potential interactions are updated based on additional Project and baseline information. From these potential interactions, the potential impacts to the various resources/receptors are identified and are elaborated to the extent possible. The diverse range of potential impacts considered in the impact assessment process typically results in a wide range of prediction methods being used including quantitative, semi-quantitative and qualitative techniques.

The impact assessment describes what will happen by predicting the magnitude of impacts and quantifying these to the extent practicable.

The term 'magnitude' covers all the dimensions of the predicted impact to the natural and social environment including:

- the nature of the change (what resource or receptor is affected and how);
- the spatial extent of the area impacted or proportion of the population or community affected;
- its temporal extent (i.e. duration, frequency, reversibility); and
- where relevant, the probability of the impact occurring as a result of accidental or unplanned events.

Once the prediction of impacts is complete, each impact is described in terms of its various relevant characteristics (e.g., type, scale, duration, frequency, extent). The terminology used to describe impact characteristics is shown in Table 7.1.

TABLE 7.1 IMPACT CHARACTERISTIC TERMINOLOGY

Characteristic	Definition	Designations
Type	The relationship of the impact to the Project (in terms of cause and effect).	Direct Indirect Induced
Extent	The "reach" of the impact (e.g., confined to a small area around the Project footprint, projected for several kilometres, etc.). For social and community health	Local Regional National International

Characteristic	Definition	Designations
	impacts, this takes into account the proportion of the households or communities within a jurisdiction that are potentially affected by the change.	
Duration	The time period over which a resource / receptor is affected. For social and community health impacts, an impact lasting less than or equal to 18-month has been considered to be temporary; impacts lasting less than five years are considered short-term, impacts lasting less than 20 years are assessed as long-term and impacts beyond this period are assessed as permanent.	Temporary Short-term Long-term Permanent
Scale	The size of the impact (e.g., the size of the area damaged or impacted, the fraction of a resource that is lost or affected, etc.). For social and community health impacts is the degree of change to a household level livelihood, individual or household level health status or quality of life	Not distinguishable Distinguishable Evident Major
Frequency	A measure of the constancy or periodicity of the impact. For example, an impact that occurs constantly has been considered to have a high frequency, while an impact that occurs as a one-off occurrence has been considered to have a low frequency.	One-off Intermittent Continuous

Source: ERM, 2012.

The definitions for the type designations are shown in Table 7.2. Definitions for the other designations are resource/receptor-specific and are discussed in the resource/receptor-specific chapters.

TABLE 7.2 IMPACT TYPE DEFINITIONS

Designations (Type)	Definition
Direct	Impacts that result from a direct interaction between the Project and a resource/receptor (e.g., sound emitted from the survey leading to behavioural changes in marine fauna or land take by the project removing agricultural land upon which a household depends).
Indirect	Impacts that follow on from the direct interactions between the Project and its environment as a result of subsequent interactions within the environment (e.g., reduction in water quality from waste discharges leading to toxic effects in marine fauna).
Induced	Impacts that result from other activities (which are not part of the Project) that happen as a consequence of the Project (e.g., influx of

Designations (Type)	Definition
	camp followers resulting from the importation of a large Project workforce).

Source: ERM, 2012.

The above characteristics and definitions apply to planned and unplanned events. An additional characteristic that pertains only to unplanned events is likelihood. The likelihood of an unplanned event occurring is designated using a qualitative scale, as described in Table 7.3.

TABLE 7.3 DEFINITIONS FOR LIKELIHOOD DESIGNATIONS

Likelihood	Definition
Unlikely	The event is unlikely but may occur at some time during normal operating conditions.
Possible	The event is likely to occur at some time during normal operating conditions.
Likely	The event will occur during normal operating conditions (i.e., it is essentially inevitable).

Source: ERM, 2012.

Table 7.4Once an impact's characteristics are defined, the next step in the impact assessment phase is to assign each impact a 'magnitude'. Magnitude is a function of some combination (depending on the resource/receptor in question) of the following impact characteristics:

- Extent
- Duration
- Scale
- Frequency

It should be noted that the extent characteristic is the preferred term as scale is mostly used when there are quantitative values available and for small scale projects where the size of the area potentially impacted can be quantified in an easy manner. For this Project, the scale will typically be the Project site/reclaimed area or will be the same as the extent characteristic as the numerical size of the impact will be too big (i.e. at a regional and/or international level) to quantify. For this reason, when assessing each one of the impacts the Type, Duration, Frequency, Extent are characterised.

The Extent of the impact, the full area over which the impact occurs. It should be:

- **Local**. Local impacts are confined to a small area, e.g.to the AoI;
- **Regional**. Regional impacts go beyond the AoI and can extend to the wilayat and/or governorate level;
- **National**. National impacts are related to more than one governorate but are confined within national borders;
- **International**. Transboundary impacts extend to multiple countries, beyond the host Country of the Project. Examples include air pollution extending to multiple countries, use or pollution of international waterways, and trans-boundary epidemic disease transmission.

The scale of the impact is the degree of change in the qualitative and quantitative conditions of resource/receptor from its ante-operam baseline status:

- **Not distinguishable** or hardly measurable change from the baseline conditions or impacts affect a limited amount of the specific component or impacts are likely to be well within statutory limits1 or ambient/seasonal range;
- **Distinguishable** change from baseline conditions or impacts affect a small portion of a specific component or impacts are expected to be within/close to statutory limits or ambient seasonal range;
- **Evident** difference from baseline conditions or impacts affect a substantial portion of a specific component or impacts are likely to result in occasional exceedances of statutory limits1 or ambient seasonal range (over limited periods);
- **Major** change in comparison to baseline conditions or impacts affect the entire or significant portion of a specific component or impacts are likely to result in routinely exceedances of statutory limits1 or ambient seasonal range (over extended periods).

For duration, impacts which last during the 17-month construction period has been considered to be temporary; impacts lasting less than five years are considered short-term, impacts lasting between 5 and 20 years are assessed as long-term and impacts beyond this period are assessed as permanent.

Frequency can be described as one-off, intermittent or continuous.

Additionally, for unplanned events only, magnitude incorporates the 'likelihood' factor discussed above.

Magnitude essentially describes the intensity of the change that is predicted to occur in the resource/receptor as a result of the impact. As discussed above, the magnitude designations themselves are universally consistent, but the definitions for these designations vary on a resource/receptor-by-resource/receptor basis (Table 7.4), as further discussed in each of the resource/receptor-specific chapters. The universal magnitude designations are:

- Positive
- Negligible
- Small
- Medium
- Large.

TABLE 7.4 MAGNITUDE DEFINITIONS

Magnitude	Physical Receptors (e.g. air, water, soils)	Biological receptors	Socioeconomical receptors
Negligible	Immeasurable, undetectable or within the range of normal natural variation.	Immeasurable, undetectable or within the range of normal natural variation.	Change remains within the range commonly experienced within the social-economic context.

Magnitude	Physical Receptors (e.g. air, water, soils)	Biological receptors	Socioeconomical receptors
Small	Minimal disturbance. Slight change in air/soil/water quality expected over a limited area with quality returning to background levels within a few meters. Discharges are well within benchmark limits.	Affects a specific group of localized individuals within a population[1] over a short time period (one generation or less), but does not affect other trophic levels or the population itself.	Perceptible difference from baseline conditions. Tendency is that impact is local, rare and affects a small proportion of receptors and is of a short duration.
Medium	Localized and/or short-term disturbance of air/soil/water components in Project area. Temporary or localized change in air/soil/water quality with quality returning to background levels thereafter. Occasional exceedance of benchmark limits.	Affects a portion of a population and may bring about a change in abundance and/ or distribution over one or more generations, but does not threaten the integrity of that population or any population dependent on it.	Clearly evident difference from baseline conditions. Tendency is that impact affects a substantial area or number of people and/or is of medium duration. Frequency may be occasional and impact may be regional in scale
Large	Widespread and/or long-term disturbance or permanent change to the air/soil/water components in Project area. Change in quality over a large area that lasts over the course of several months with quality likely to cause secondary impacts on ecology. Routine exceedance of benchmark limits.	Affects an entire population or species in sufficient magnitude to cause a decline in abundance and/ or change in distribution beyond which natural recruitment (reproduction, immigration from unaffected areas) would not return that population or species, or any population or species dependent upon it, to its former level within several generations.	Change dominates over baseline conditions. Affects the majority of the area or population in the Area of Influence and/or persists over many years. The impact may be experienced over a regional or national area.

Source: ERM, 2012

In the case of a positive impact, no magnitude designation (aside from 'positive') is assigned. It is considered sufficient for the purpose of the ESIA to indicate that the Project is expected to result in a positive impact, without characterising the exact degree of positive change likely to occur.

[1] In discussing the importance of biological resources and receptors it is useful to attempt to describe how important the project area is to each population being assessed, especially for populations of fish, mammals and seabirds that hunt and range over a wide area. A particular species may be of high importance but the project area may be of low value to that species or make up a tiny percentage of its regional range.

7.2.2 SENSITIVITY OF RECEPTORS

In addition to characterising the magnitude of impact, the other principal impact evaluation step is definition of the sensitivity of the impacted resource/receptor. There are a range of factors to be taken into account when defining the sensitivity of the receptor, which may be physical, biological, cultural or human. Other factors may also be considered when characterising sensitivity, such as legal protection, government policy, stakeholder views and economic value.

As in the case of magnitude, the sensitivity designations themselves are universally consistent, but the definitions for these designations vary on a resource/receptor basis (Table 7.5). The universal sensitivity designations are:

- Low
- Medium
- High

For ecological resources, sensitivity can be assigned as low, medium or high based on the conservation value (including protection status) of habitats and species, their ecosystem functions and their sensitivity to the impact. For habitats these are based on factors such as naturalness, extent, rarity, fragility, diversity and importance as a community resource. For species, protection, conservation status and ecosystem role are considered.

Sensitivity is not an inherent characteristic of a receptor or resource. It is the degree to which it is tolerant of, adaptable to and able to recover from a change in its environment. Therefore, in addition to considering the quality and importance of the affected receptor or resource, its response to a particular impact is also considered. It is possible for a resource or receptor to interact with the Project, be of high value but not be sensitive to its impacts.

For socio-economic and health impacts, where the receptor is human, the vulnerability of the individual, community or wider societal group is considered. Levels of sensitivity are assessed based on the receptors' ability to adapt to changes brought by the Project and opportunities associated with it. Receptors with a high ability to adapt to changes will have a low sensitivity whilst those with profound or multiple levels of sensitivity that undermine the ability to adapt to changes will have a high sensitivity.

TABLE 7.5 SENSITIVITY CRITERIA FOR ENVIRONMENTAL AND SOCIOECONOMIC RECEPTORS

Sensitivity	Physical Receptors (e.g., air, water, soils)	Biological receptors	Socioeconomical receptors
Low	Existing airshed/water/soil quality is good and the ecological resources that it supports are not sensitive to disturbance.	Ecological receptors are abundant, common or widely distributed and are generally adaptable to changing environments Species are not endangered or protected.	Minimal vulnerability: consequently with a high ability to adapt to changes brought by the Project and opportunities associated with it.

Sensitivity	Physical Receptors (e.g., air, water, soils)	Biological receptors	Socioeconomical receptors
Medium	Existing airshed/water/soil quality shows some signs of stress and/ or supports ecological resources that could be sensitive to change in quality or physical disturbance (secondary ecological impacts are possible).	Some ecological receptors have low abundance, restricted ranges, are currently under pressure or are slow to adapt to changing environments. Species are valued locally / regionally and may be endemic, endangered or protected.	Some, but few areas of vulnerability; still retaining an ability to at least in part adapt to change brought by the Project and opportunities associated with it.
High	Airshed/water/soil quality is already under stress and/ or the ecological resources it supports are very sensitive to change (secondary ecological impacts are likely).	Some ecological receptors in the area are rare or endemic, under significant pressure and / or highly sensitive to changing environments. Species are valued nationally /globally and are listed as endangered or protected.	Profound or multiple levels of vulnerability that undermine the ability to adapt to changes brought by the Project and opportunities associated with it.

Source: ERM, 2012

7.2.3 EVALUATION OF SIGNIFICANCE

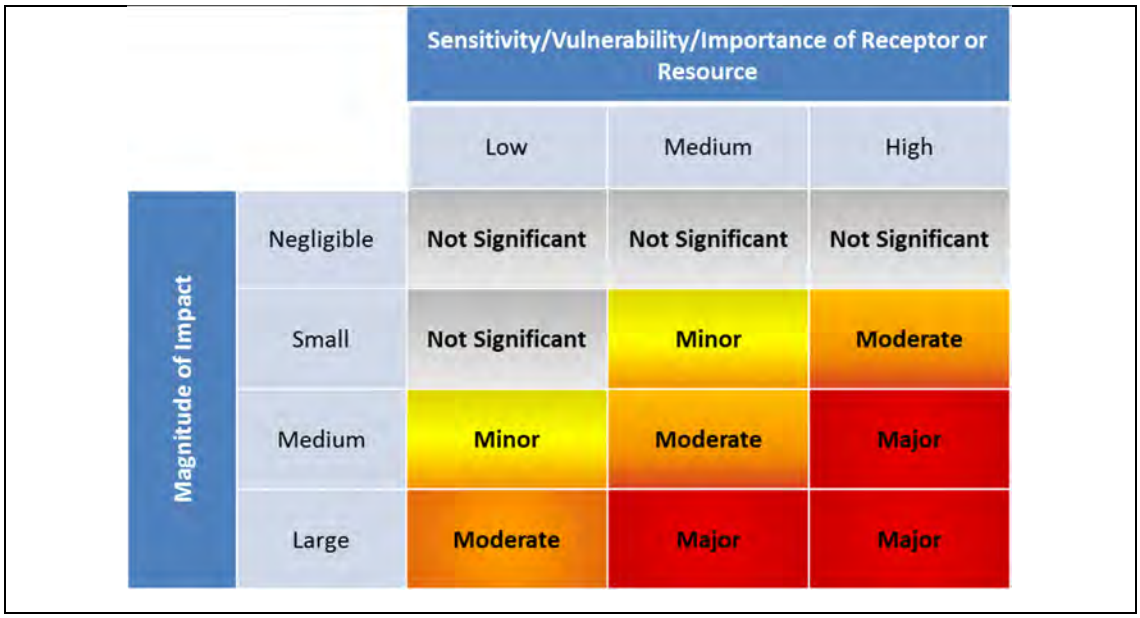
Virtually all human activity imposes some disturbance to aspects of the natural and social environment because of physical impacts on natural systems or due to interactions with other human activities. To provide information to decision makers and other stakeholders on the importance of different Project impacts an evaluation of the significance of each effect will be made by the ESIA team.

The evaluation of impacts presented in the ESIA will be based on the judgement of the ESIA team, informed by legal standards, national and regional government policy, current industry good practice and the views of stakeholders.

The quality or importance of a resource will be judged considering, for example, it is local, regional, national or international designation, its importance to the local or wider community, its ecosystem function or its economic value. The assessment of the sensitivity of human receptors, will consider their ability to adapt to change brought by the Project. Receptor sensitivity is considered High when receptors have little capacity and means to adapt to a given change and to maintain or improve quality of life (i.e., when they have low resilience). In this context, 'receptors of high sensitivity' may include vulnerable groups. Receptor sensitivity is considered Moderate when there is limited capacity and means to adapt to a given change and maintain/improve quality of life (i.e., Moderate resilience). Receptors of Moderate sensitivity may include individuals who rely heavily on their livelihood to maintain their socioeconomic status and have a limited ability to adapt to change and/or physical features likely to be subjected to moderate but sustainable change with physical integrity maintained. Receptor sensitivity is considered Low when there is a moderate to high capacity and means to adapt to a given change and maintain or improve quality of life (i.e., high resilience). Receptors of low sensitivity may include individuals who are able to quickly adapt to temporary disruption in their living conditions, livelihood status, or a change in the status of public infrastructure (such as a road closure) and/or features likely to remain unaffected or marginally affected.

Magnitude and receptor quality/importance/sensitivity are looked at in combination to evaluate whether an impact is, or is not, significant and if so its degree of significance (defined in terms of Minor, Moderate or Major). Impacts classed as Not Significant include those that are slight or transitory, and those that are within the range of natural environmental and social change. This principle is illustrated schematically in Figure 7.2.

FIGURE 7.2 EVALUATION OF SIGNIFICANCE



Source: ERM (2020)

The matrix applies universally to all resources/receptors, and all impacts to these resources/receptors, as the resource/receptor-specific considerations are factored into the assignment of magnitude and sensitivity/vulnerability/ importance designations that enter into the matrix. Table 7.6 provides a context for what the various impact significance ratings signify.

It is important to note that impact prediction and evaluation take into account any embedded controls (i.e., physical or procedural controls that are already planned as part of the Project design, regardless of the results of the impact assessment process). An example of an embedded control is a standard acoustic enclosure that is designed to be installed around a piece of major equipment. This avoids the situation where an impact is assigned a magnitude based on a hypothetical version of the Project that considers none of the embedded controls.

To assess the significance of the impacts, they must be reflected in the local environmental frame of reference. For instance, communities with strong cultural norms may be more disrupted by the influx of a non-local workforce than people living in a cosmopolitan place. In this way, stakeholders' views on impacts are explicitly incorporated into the assessment, for example by making reference to development policies and plans and/or by reporting the results of stakeholder consultations, including quotes from consultations, etc. Thus, the importance of socio-economic impact is assessed in terms of the importance that stakeholders attach to that impact.

TABLE 7.6 CONTEXT OF IMPACT SIGNIFICANCES

An impact of **negligible** significance is one where a resource/receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.

An impact of **minor** significance is one where a resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small (with or without mitigation) and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards.

An impact of **moderate** significance has an impact magnitude that is within applicable standards, but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly, to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that impacts of moderate significance have to be reduced to minor, but that moderate impacts are being managed effectively and efficiently.

An impact of **major** significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of IA is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long-term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a facility. It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones, such as employment, in coming to a decision on the Project.

Source: ERM, 2012.

7.2.4 MITIGATION MEASURES

One of the key objectives of an ESIA is to identify and define socially and environmentally acceptable, technically feasible and cost-effective mitigation measures. Mitigation measures are developed to avoid, reduce, remedy, or compensate for the significant negative impacts identified during the ESIA process, and to create or enhance positive impacts such as environmental and social benefits. In this context the term mitigation measure includes operational controls as well as management actions.

Where a significant impact is identified, a hierarchy of options for mitigation is explored as set out in Box 7.1.

BOX 7.1 MITIGATION HIERARCHY

Avoid at Source; Reduce at Source: avoiding or reducing at source through the design of the Project (e.g., avoiding by siting or re-routing activity away from sensitive areas or reducing by restricting the working area or changing the time of the activity).

Abate on Site: add something to the design to abate the impact (e.g., pollution control equipment, traffic controls, perimeter screening and landscaping).
Abate at Receptor: if an impact cannot be abated on-site then control measures can be implemented off-site (e.g., noise barriers to reduce noise impact at a nearby residence or fencing to prevent animals straying onto the site).
Repair or Remedy: some impacts involve unavoidable damage to a resource (e.g. agricultural land and forestry due to creating access, work camps or materials storage areas) and these impacts can be addressed through repair, restoration or reinstatement measures.
Compensate in Kind; Compensate Through Other Means: where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate (e.g., planting to replace damaged vegetation, financial compensation for damaged crops).
Source: ERM (2020)

Mitigation measures are often established through industry standards and may include the following:

- changes to the design of the Project during the design process (e.g. changes to the location of Solar Panels);
- engineering controls and other physical measures applied (e.g. use of sound proofing, bunding in fuel storage areas); and
- operational plans and procedures (e.g. notification to nearby communities or waste management plans).

For impacts initially assessed during the ESIA process to be of 'Major significance', a change in design is usually required to avoid, reduce, or minimise these impacts, followed by a reassessment of significance. For impacts assessed during the ESIA process to be of 'Moderate significance', where appropriate the discussion explains the mitigation measures that have been considered and selected, and the reasons for that selection (e.g. in terms of technical feasibility and cost-effectiveness). Impacts assessed to be of 'Minor significance' are usually managed through good industry practice, operational plans, and procedures, but also managed with mitigation measures, depending on the case.

The ESIA is intended to help decisions on projects to be made in full knowledge of their likely impacts on the environment and society.

Residual impacts are impacts assessed after mitigation has been applied. The residual impacts and their significance are reported in this ESIA, based on the proposed Project as described, i.e. inclusive of all proposed mitigation.

The mitigation measures and monitoring plans discussed in this section are presented in more detail in Section 8.

The mitigation measures proposed throughout the document are based on the knowledge of ERM/5OES experts and take into consideration: 1) international best practice/project international standards, 2) the mitigation measures proposed in the **local ESIA** (June 2024) and 3) The **EA's Local permit conditions** (October 2024). It is noteworthy that there was an

initial set of permit conditions issued by EA in July 2024 after the approval of the Local ESIA A; however, some of these were discussed due to potential inapplicability, between the Project Proponent and EA on 23rd September 2024; being the final version of these permit conditions issued in 17th October 2024. Appendix B includes a copy of the EA's Local Environmental Permit and permit conditions.

7.2.5 ASSESSING AND REPORTING IMPACT SIGNIFICANCE

Reporting the significance of a residual impact is based on:

- the predicted magnitude of an impact, taking into consideration all the mitigation measures the project team is committed to that are relevant to that impact; and (where appropriate);
- the sensitivity of the receptor.

The degree of significance attributed to residual impacts is related to the weight considered by the ESIA team, based on the understanding of the decision making/approval conditions of authorities on the proposed Project.

Impacts of 'Major significance' are considered to warrant substantial weight, when compared with other environmental, social, or economic costs and benefits, for those making decisions on the Project; conditions will be expected to be imposed to control and, if necessary, monitor adverse impacts.

Impacts of 'Moderate significance' are considered to be of reducing importance to making decisions, but still warranting careful attention to conditions regarding mitigation and monitoring, to ensure the most appropriate (technically feasible and cost-effective) mitigation measures are used and to ensure benefits are delivered.

Impacts of 'Minor significance' are brought to the attention of decision-makers but will be identified as warranting little, if any, weight in their decision; mitigation will be achieved using normal good practice and monitoring may be required to confirm that impacts are as predicted.

7.2.6 UNCERTAINTY

Even with a final project description and an unchanging environment, predictions of impacts and their effects on resources and receptors can be uncertain. Predictions can be made using varying means ranging from qualitative assessment and expert judgement through to quantitative techniques (e.g. noise modelling). The accuracy of predictions depends on the methods used and the quality of the input data for the Project and the environment. Where uncertainty affects the assessment of impacts a conservative (i.e. reasonable worst case) approach to assessing the likely residual impacts is adopted with mitigation measures developed accordingly. To verify predictions and to address areas of uncertainty, monitoring plans are proposed for some potential impacts.

ERM carried out the impact assessment with the information provided by the Client on the established dates. In case of erroneous information or gaps in the information, the impact assessment cannot be performed again because the deadlines must be met.

7.2.7 UNPLANNED EVENTS

For accidental events, the methodology is slightly different, as the events may or may not occur, risk assessment methodology is normally used. This risk assessment method includes the concept of likelihood or frequency of event, which is then combined with the consequence of the event, its severity. That severity of the consequence is assessed in the same way as the routine events, combining the magnitude of the impact and the sensitivity of the receiving environment.

As mentioned, both variables are looked at in combination to evaluate whether an impact due to an accidental event is significant. Significance depends on the level of acceptability of the risk. Risk magnitudes, when possible, can be quantified (as with Quantitative Risk Assessments used traditionally for assessing industrial risks with potential effects on human health and safety). If not possible, different legal or social events are usually assessed to determine risk acceptability levels.

The general degree of impact significance for accidental events is usually assessed with qualitative matrices, as the Risk Matrix (refer to Table 7.7), which is used in evaluating the severity and likelihood of accidental events occurring from the Project. The philosophy of these matrices is that frequency/likelihood of events and their consequences are inversely related. The most frequent and likely events usually have small consequences (for examples small leaks) whereas inversely events with potential catastrophic consequences are very rare or improbable. There are three main areas of significance in this matrix, which is similar to all other matrices used for this purpose.

- The green area are the normally acceptable risks, which combine events with different degree of probability, but low severity. The typical examples of those are small leaks and spills, which in fact even as conceptually accidental, they are so frequent that are classically assessed as routine impacts.
- On the contrary, the red zone are the unacceptable risks, which relate to very rare/infrequent events with catastrophic consequences. The problem of these risks is that if they have happened at least once or could potentially happen (case of massive spills in the ocean or industrial accidents with casualties) they are intrinsically unacceptable, but in practice some of them permitted if they can be moved to the yellow area, applying feasible and practical mitigation measures, either or both lowering the probability of occurrence of the event and/or their consequences.
- In practice, most of the relevant identified risks will fall on the yellow area, risks which have a medium probability and severity. These risks need to be demonstrated to be reduced to a concept As Low As Reasonably Practicable (ALARP), There is no universally accepted definition of ALARP and it is assessed on a case by case basis.

TABLE 7.7 RISK ASSESSMENT MATRIX

Likelihood of Occurrence	Severity of Consequence: Minor (1)	Moderate (2)	Serious (3)	Very Serious (4)	Catastrophic (5)	Disastrous (6)
6	6	12	18	24	30	36
5	5	10	15	20	25	30
4	4	8	12	16	20	24
3	3	6	9	12	15	18
2	2	4	6	8	10	12
1	1	2	3	4	5	6

Source: ERM, 2012

The severity and likelihood rating descriptions are provided in Table 7.8 and Table 7.9 below.

TABLE 7.8 SEVERITY OF CONSEQUENCE DESCRIPTIONS

Severity Rating	Description
1 – Minor	Impact with negligible environmental and/or social impact
2 – Moderate	Impact with limited environmental and/or social consequences
3 – Serious	Impact with significant environmental and/or social consequences
4 – Very Serious	Impact with highly significant environmental and/or social consequences
5 – Catastrophic	Large-scale impact (e.g. ecosystems having recognized ecological value, and/or large-scale impact on populations)
6 – Disastrous	Impact having massive and durable consequences (e.g. vast ecosystems having a high ecological value, and/or impact having massive and durable consequences on populations)

TABLE 7.9 LIKELIHOOD OF OCCURRENCE DESCRIPTIONS

Likelihood	Description
1 – Remote	Event physically possible but has never or seldom occurred over a period of 20 to 30 years for a large number of sites (> few thousands)
2 – Extremely Unlikely	Has already occurred in the industry but corrective action has been taken
3 – Very Unlikely	One time per year for at least 1000 units. One time for every 100 to 200 similar plants in the world over 20 to 30 years of plant lifetime. Has already occurred in the company but corrective action has been taken.
4 – Unlikely	Could occur once for every 10 to 20 similar plants over 20 to 30 years of plant lifetime
5 – Likely	Could occur several times during plant lifetime
6 – Very Likely	Expected to occur several times during plant lifetime

7.2.8 CUMULATIVE IMPACT ASSESSMENT METHODOLOGY

IFC Performance Standard 1 provides a definition for cumulative impacts, as impacts that:

> "result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted."

Cumulative impacts are those that act together with other impacts, from the same or other projects, to affect the same environmental or social resource or receptor. Project impacts will combine with impacts from established and future industrial activities to form into cumulative impacts.

The Project is located within PDO's Block 6 concession area and close to PDO's Saih Nihaydah gas depletion compression facility at approximately 4 km whose purpose is to maintain reservoir pressure in the wells that make up the field. The nearest well is approximately 700 m away from the Project site. The closest airport (Qarn Alam) is located approximately 11 km south of the Project site; this airport is owned and operated by PDO. It should be noted that the Project Proponent has obtained a No Objection Certificate (NOC) from the Civil Aviation Authority (CAA) for the development and operation of this Project.

Key cumulative impacts are likely to include potential impacts on the physical, biological, and social environment with regard to air quality, noise, ecology and community health, safety and security (HSS), respectively.

Cumulative impacts are generally considered to be impacts that act with impacts from other projects such that:

- The sum of the impacts is greater than the parts; or

- The sum of the impacts reaches a threshold level such that the impact becomes significant.

The types of cumulative impacts that may be relevant are the following:

- Accumulative: the overall effect of different types of impacts from the project at the same location. An example would be fugitive dust emissions, construction noise and construction traffic all impacting the nearby local communities as a nuisance/ disturbance.
- Interactive: where two different types of impacts (which may not singly be important) react with each other to create a new impact (that might be important). An example would be water abstraction from a watercourse, which might exacerbate the impacts caused by increased sediment loading.
- Additive or In-combination: where impacts from the primary activity (i.e. the construction and operation of the Project) are added to impacts from third party activities e.g. other major projects in the vicinity of the Project which are already occurring, planned or may happen in the foreseeable future. In this case, we would refer to impacts from other heavy industries located at the Project Area. Such impacts may arise due to spatial overlap (e.g. overlap in spatial extent of water quality changes) or temporal overlap (e.g. sound impacts caused by construction activities at the same time from different sources).

Overall there are many challenges associated with conducting a Cumulative Impact Assessment (CIA) process including lack of basic baseline data, uncertainty associated with anticipated developments, limited government capacity, and absence of strategic regional, sectoral, or integrated resource planning schemes. As feasible, Cumulative Impacts will be assessed following the guidance of the IFC document Good Practice Handbook (GPH) on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets, published in 2013.

What the guideline recommends, and it is adopted in this ESIA, is a useful preliminary approach for developers in emerging markets to conduct a rapid cumulative impact assessment (RCIA). The RCIA can be an integral component of the ESIA or a separate process: in this specific case it has been included as a component of the ESIA study. RCIA entails a desk review enables the developer to determine whether its activities are likely to significantly affect the viability or sustainability of selected Valued Environmental and social Components (VECs).

Depending on the scenario, the RCIA may evolve into a more robust and comprehensive CIA, which requires the participation of many parties and is best led by local governments or regional planners.

The overarching objectives of the identification and assessment of cumulative impacts are the following:

(a) recognition by each party that their actions, activities, and projects may contribute to cumulative impacts on Valued Environmental and social Components (VECs) on which other existing or future developments may also have detrimental effects; and

(b) avoid and/or minimise these impacts to the greatest extent possible. Furthermore, their developments may be at risk because of an increase in cumulative effects over ecosystem services they may depend on.

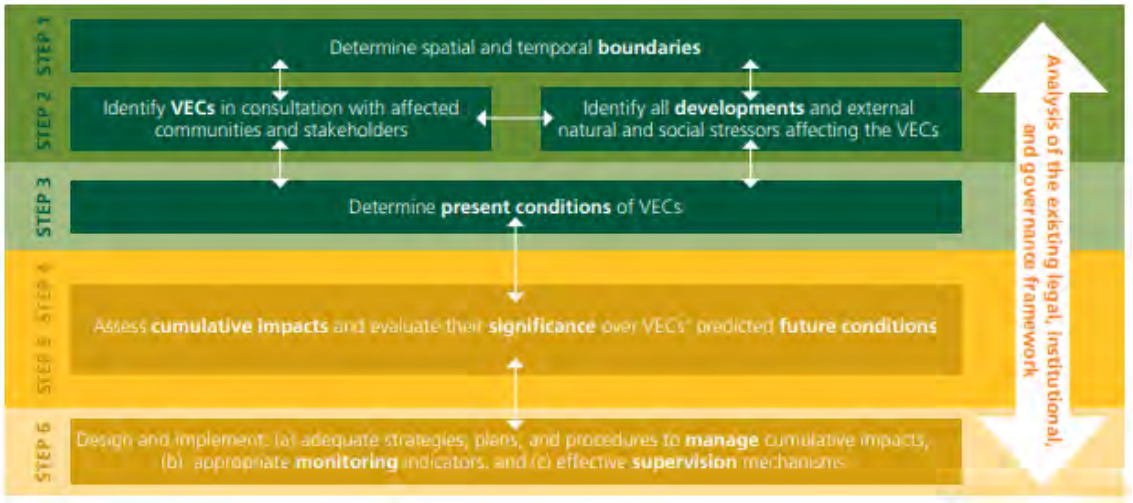
In order to accomplish these objectives, the RCIA logical framework includes a six-step process (as shown in the following Figure 7.3):

- Scoping (Steps 1 and 2),

- VEC baseline determination (Step 3),
- assessment of the contribution of the development under evaluation to the predicted cumulative impacts (Step 4),
- evaluation of the significance of predicted cumulative impacts to the viability or sustainability of the affected VECs (Step 5), and
- design and implementation of mitigation measures to manage the development's contribution to the cumulative impacts and risks (Step 6).

In Section 7.9 – Cumulative Impacts, it is describing how this six-step approach has been implemented in this ESIA, including the objectives of each step and how they have been accomplished in the assessment.

FIGURE 7.3 RAPID CIA – SIX-STEP PROCESS



Source: IFC, 2013

7.3 REVISED SCOPE OF THE ESIA

Both the scoping report and the EIA Rev A are based mainly on desktop studies. Following a thorough review of the natural and social environment of the project, the ERM/5OES team have revised the potential project interactions with the receiving environment.

Based on this, the following Table 7.10 presents the updated Scope of Work of the ESIA Rev B. Where changes have been made since the previous studies, justification is provided.

TABLE 7.10 ESIA Rev B Scope of Work, In Comparison With 1) Scoping Report And 2) EIA Rev A

Domain	Approach included in the Scoping Report of 28/2/2023	Revised approach to the Local ESIA (Rev. A) following Omani standards only	Revised approach to the International ESIA (Rev. B) following international standards
Terrestrial Ecology	1. AOI for Terrestrial Ecology of 25 km, due to i) migratory water birds attracted to surface waterbodies within 25 km of the site, ii) home ranges of larger mammal species. The scoping study allows for subsequent refinement during the impact assessment as more baseline information becomes available.	1. AOI for habitats will be limited to 5 km only, except for bird attractants that will be 25 km of the project site. Reduction of AOI for non-avian ecology is due to a very low vegetation cover of widespread plant species and a very low abundance and diversity of large mammals observed on site.	1. Same approach as in Local ESIA.
Terrestrial Ecology	2. Bats: Undertake a biodiversity baseline (and specific birds and bats survey), develop mitigation measures, summarize in project construction CEMMP and Biodiversity Management Plan.	2. Bat survey is not usually required for solar projects since bats are not a group that is considered to be impacted by them (Bennun et al., 2021). In addition, in the project area there is absence of suitable habitats (trees with cavities/ artificial cavities/ water) that could attract this group.	2. Same approach as in Local ESIA
Terrestrial Ecology	3. Birds: Undertake a bird and bat survey as part of the biodiversity baseline, including waterbodies in the bird AOI (25 km). Address any potential sensitivities regarding bird migration routes and IBAs.	3. Bird Surveys consisted of drive over surveys of the project site and wetlands in the AOI (25 km) and camera trapping at three locations which were conducted in May 2024.	3. Bird Survey continuation of drive over surveys on site and in waterbodies in the 25 km AOI into the summer months of 2024.
Terrestrial Ecology	4. Analysis of the plant community present on site to determine species, their distribution, their conservation status (IUCN and Oman Plant Red List), and the presence (if any) of important habitats in the project area. Fauna to be surveyed by drive over survey to identify tracks and signs.	4. As per the scoping report	4. Impact Assessment of invertebrates (including insects) scoped out as the baseline did not identify any sensitive species.

Domain	Approach included in the Scoping Report of 28/2/2023	Revised approach to the Local ESIA (Rev. A) following Omani standards only	Revised approach to the International ESIA (Rev. B) following international standards
Terrestrial Ecology	5.Critical Habitat Assessment to be undertaken and ecosystem services provided by habitats on site to be identified.	5. Critical Habitat Assessment (CHA) and analysis of ecosystem services is not required by Omani standards; therefore, it was scoped out for Local ESIA.	5.A screening CHA will be prepared to comply with international standards, and an assessment of ecosystem services to be incorporated into ESIA.
Hydrology (surface & groundwater)	1. A hydrology/flood risk study to be conducted by proponent and reviewed for inclusion in the EIA. The study should be informed by modelling	1. At the time of submission of the Local ESIA, the flood risk assessment report (being prepared by Project Proponent) was not available; however, based on bibliography, the site does not fall in a recognized flood risk area; therefore, flood risk was considered to be low. This assumption has been confirmed now that the flood risk assessment report became available (June 2024). This can be later shared with EA if necessary.	1. Results from the flood risk assessment report (Worley Consultants, 2024) has been incorporated into the International ESIA.
Hydrology (surface & groundwater)	2. No Hydrology AOI was established	2.No Hydrology AOI was established for the local EIA	2. An AOI of 2 km was established for the International ESIA considering the low flood risk and small catchments in which the project is located.
Hydrology (surface & groundwater)	3. Groundwater	3. The project area is not located in a groundwater protection zone. Groundwater (lens) occurs 12-13 m below ground level, but the main exploitable aquifer is in the Fars and UER formations which occur 75-90 m below ground level (HMR, 2002), separated by a layer of dolomitic limestone of the Rus Formation. Therefore, potential groundwater contamination due to project activities is considered scoped-out. In addition, the project doesn't foresee groundwater extraction. Thererfore, potential impacts on groundwater related to water use are also scoped out. In summary, impact to groundwater is scoped-out.	3. Same approach as in Local ESIA

Domain	Approach included in the Scoping Report of 28/2/2023	Revised approach to the Local ESIA (Rev. A) following Omani standards only	Revised approach to the International ESIA (Rev. B) following international standards
Air Quality	1. No AOI for air quality was specified in the scoping report	1.No AOI was specified for Air Quality in the local EIA	1. An AOI of 1 km was established for the International ESIA considering the low emissions from the project, with the priority emission being dust (which is expected to settle within 500 m of the project boundary)
Air Quality (AQ)	2. Baseline of air quality to include PM10 concentrations. One station to be monitored for 24 hrs, with an additional two stations taking PM10 measurements over 15 minutes.	2. It is expected that AQ impacts will only arise during the construction phase of the Project and will be limited to dust only. Given the location of the Project, baseline PM10 and dust are expected to be above Omani and IFC standards and nuisance guidelines due to natural sources under windy conditions. Likewise, there are no sensitive receptors within 5 km of the Project site. Therefore, since there is no potential interaction between the Project activities and receptors, a qualitative impact assessment was presented. An AQ baseline survey was undertaken using AQMS for 24 h at one location for one day to understand air quality on site mainly for the purpose of the occupational health.	2. Same approach to baseline data collection as in Local EIA. The following conditions of the EA permit (October 2024) shall be taken into account (when applicable) in the plans indicated in the CEMMP and the mitigation measures of the ESIA: "The company must control the emission of pollutants, dust, unpleasant odors, and other environmental nuisances from storage and handling areas, and adhere to environmental practices and regulations established by the Authority (EA)"
Climate Change and GHG emissions	1.GHG emissions to be estimated for construction and operational phases using IPCC 2006 emission factors.	- Fuel combustion during the construction phase for diesel generations and mobile plant, as well as transportation of solar PV components will result in GHG emissions. Sulphur hexafluoride SF_6 may be used in high voltage electrical equipment as insulating gas for the switchgear. SF_6 is a known GHG. No other ozone depleting substations (ODS) are anticipated to be used by the Project. A very high-level account of GHG emissions for the project was provided for both construction and operations phase. EIA Rev A was approved by EA in July 2024, and no comments were received regarding these estimates.	1. Based on the nature and scale of this renewable energy project, and the estimates made in ESIA Rev A, annual estimate of greenhouse gas (GHG) emissions (Scope 1+2) over the lifetime of the Project is expected to be less than the EP4 threshold value of significance of 100,000 tonnes of carbon dioxide equivalent (tCO2e) per year; therefore, a formal GHG Quantification and Alternative Analysis is not considered necessary according to international standards. Likewise, since the energy generated by the Project will avoid emissions that would otherwise be generated wholly or partly from more carbon-intensive higher GHG emitting

Domain	Approach included in the Scoping Report of 28/2/2023	Revised approach to the Local ESIA (Rev. A) following Omani standards only	Revised approach to the International ESIA (Rev. B) following international standards
			sources and since it is a renewable energy generation project, whose operation phase emissions are considered to displace emissions that will otherwise be sourced from other electricity generation technologies, no transitional CCRA is considered necessary. The Project is, in fact, considered to have a positive impact on climate change. However, in case, more detailed and accurate GHG emission estimates may be required by LTA/Lenders in the future, this will need to be provided by TTE/OQ once the design in finalized to confirm the current assumptions.
Climate Change and GHG emissions	2. Climate risk assessment	2. Following MDs 117/2013 and 20/2016, a Climate Change Affairs chapter was included in Local EIA (EIA Rev A), which was approved in July 2024.	2.Regarding the physical CCRA, International ESIA presents a screening assessment to examine the potential physical material risks and opportunities. After this screening assessment, additional stages will include cost estimate and development of a CCRMP. EA Permit Conditions related to Climate Change/GHG include: "the company must use appropriate means and techniques to enhance energy efficiency and reduce consumption to the maximum extent possible.
Noise	1. No formal Noise AOI was provided in the scoping report, the report indicated that noise would not be significant beyond 500 m from the project boundary.	1. No AOI was presented in the local EIA and noise impact assessment was qualitative.	1. A noise AOI of 1 km has been applied in the International ESIA, which considered noise emissions expected during the construction and operational phase, the lack of sensitive receptors in the vicinity of the project, and livestock that range freely in the area.

Domain	Approach included in the Scoping Report of 28/2/2023	Revised approach to the Local ESIA (Rev. A) following Omani standards only	Revised approach to the International ESIA (Rev. B) following international standards
Noise	2. Baseline noise levels to be sampled for day time and evening periods (work week only)	2. There are no sensitive receptors within 2 km of the Project site, and noise emissions are expected to be minimal, with greatest noise emissions occurring during construction. Therefore, since there is no potential interaction between the Project activities and receptors, impact is scoped-out. In any case, a noise baseline survey was undertaken using Sound Level meters for 24 h at one location and 15 min spot measurements at seven locations to understand noise on site mainly for the purpose of the occupational health.	2. Same approach as in Local ESIA.
Water Quality	1. No water quality AOI or sampling requirements (of surface water bodies) was specified in the scoping report.	1. No surface water bodies occur within 5 km of the project boundary and will not be impacted by the project. Surface water bodies beyond this distance are considered as bird attractors in the Bird AOI (25 km) with respect to the ecological impact assessment.	1. Same general approach as applied in the Local ESIA, extended by collecting three water samples from surface water bodies in the Bird AOI (25 km)
Soil and Geology	1.During Operation expected impacts relate to soil contamination due to water effluents from cleaning under the PV panels. Develop Soil Erosion Management Plan and consider restoration of vegetation are considered possible	---	1. Measures related to soil & geology impacts are considered in the Construction & Operations CEMMP and associated plans (e.g. Pollution Prevention & Control Plan). In addition, the following EA permit conditions are considered (October, 2024): -"The company must increase green spaces to match local environmental conditions" "Soil from areas where there are potential sources of contamination such as substations and diesel generators, as well as other potential sources of contamination shall be covered with reinforced concrete, in order to prevent the seepage of contaminants into the ground."
Social and Human Rights	1. No Social AOI was established in the scoping report	1. A social AOI of 15 km was introduced in the local EIA as the Project has low potential for impact on the social context of the site. One settlement, Abu	1. A social AOI of 15 km is maintained in the International ESIA, and stakeholder engagement and disclosure is to be carried out with the office of the Wali of Adam.

Domain	Approach included in the Scoping Report of 28/2/2023	Revised approach to the Local ESIA (Rev. A) following Omani standards only	Revised approach to the International ESIA (Rev. B) following international standards
		Thaylah, and contractor camps serving PDO operations in the area occur in the Social AOI	
Social and Human Rights	2. Stakeholder engagement consists of i) OQAE, ii) Environment Authority (EA), iii) OPAZ, iv) Office of the concerned Wali.	2.Stakeholder engagement was carried out with OQAE and EA. OPAZ is not a stakeholder relevant to this project, so was not engaged. Engagement with Wali's office was not possible in the timeframe of the local EIA.	2. A Stakeholder Engagement Plan (SEP) has been prepared to meet with international standards. Stakeholder engagement and disclosure is being/will be executed following the SEP.
Social and Human Rights	3. Social baseline needs to be undertaken	3. Social baseline data gathering had not been undertaken, so it was proposed as a mitigation measure.	3. Social baseline was undertaken
Social and Human Rights	4. Human Rights Assessment: Carry out a Human Rights risk/impact assessment in alignment with UNGP's Guiding Principles on Business and Human Rights and the Equator Principles (e.g. using methodology, local context, benchmarking, identification of actual/potential human rights risks, company practices, risk mitigation measures and access to remedy).	4. A Human Rights Assessment (HRA) and Stakeholder Engagement Plan are not required by Omani standards; therefore, these were scoped out of the Local EIA.	4. A Screening Human Rights Assessment (HRA) and a Stakeholder Engagement Plan (SEP) have been prepared to meet with international standards. Stakeholder engagement and disclosure is being/will be executed following the SEP.
Traffic	1. Traffic to be considered in the local EIA with regards to impacts to the local community (health and safety, disruption), air quality (GHG emissions and dust) and noise.	---	1. There will be no deviation from the scoping study in the international ESIA.
Landscape	1. No Landscape AoI was provided in the scoping report. Sensitive receptors and viewsheds to be identified in the baseline. Walk over and photography of the project site to identify topographic features	1. A theoretical zone of visibility of 5 km was established in the local EIA	1. An AOI of 5 km has been established in the International ESIA A Landscape and Visual Impact Assessment (LVIA) has been included in the International ESIA, including photomontages.
Indigenous People	1. The scoping report found issues surrounding indigenous people (PS7) to be not applicable	----	1. No indigenous people have been identified in the project area based on sources from groups such as the International Working Group for Indigenous Affairs (IWGIA); therefore, IFC PS 7 is not applicable.

Domain	Approach included in the Scoping Report of 28/2/2023	Revised approach to the Local ESIA (Rev. A) following Omani standards only	Revised approach to the International ESIA (Rev. B) following international standards
Livelihood Restoration Plan	1. The scoping report found issues surrounding resettlement (PS5) to be not applicable to the project.	1. Local EIA excluded consideration of resettlement and economic displacement as this is not required by EA as content for impact assessment.	1. No physical or economic displacement foreseen. In case that there are economically affected people for the construction of the solar plant, the Design Change Management Procedure will be triggered and the PS5 will apply

7.4 IMPACT IDENTIFICATION MATRIX

The impact identification matrix presented in Table 7.11 assesses interaction of Project activities with physical, biological, and social aspects to identify potential impacts. Each marked cell on the impact matrix represents a potential interaction between a project activity and an environmental or social and health receptor or resource (i.e., potential impact).

Blank cells in the matrix indicate no primary effect or an absence of the resources in the general area. These interactions have not been included in the detailed impact assessment, as their impact is considered non-existent or negligible (i.e., they are not expected to lead to a significant impact).

TABLE 7.11 IMPACT IDENTIFICATION MATRIX

	PHYSICAL RECEPTORS							BIOLOGICAL RECEPTORS			SOCIOECONOMIC RECEPTORS				
	Air Quality	Climate Change	Geology and Soil	Acoustic	Hydrology	Groundwater	Landscape & Visual	Terrestrial Ecology & Habitats	Protected areas	Sensitive species	Economy, Employment & Income	Local Infrastructure, & Services	Community Heatlth & Safety	Land Use & Ecosystem Services	Project Workers
Routine Project Activities															
Construction or repowering															
Site preparation: including clearing, grading, and levelling to create flat land	X		X	X	X		X	X		X				X	
Construction of temporary construction compound, lay-down area and guardhouse	X	X	X	X	X		X	X		X				X	
Construction of internal roads and drainage system (as required), inter-linking the external site access road, panels' locations and step-up substation	X	X	X	X	X		X							X	
Installation of security fencing and security system around the Project site			X	X	X		X							X	
Vehicle movement, including road transportation of project components from Sohar Port to the site	X	X	X	X	X		X	X		X		X			
Influx of workers	X	X						X		X	X	X	X		X
Installation of inverters, transformers, PV panels and their foundations, step-up substation, meteorological stations, electrical infrastructure and signal cables	X	X	X	X	X		X							X	
Excavation of trenches for cable laying;	X	X	X	X	X									X	
Resource consumption (water, energy, etc.)	X														
Waste and wastewater management			X	X	X										
Removal of construction equipment and temporary facilities and reinstatement	X		X	X	X		X								X
Commissioning of site equipment	X	X													
Operation															
Workers management								X		X	X	X	X		X
Vehicle movement	X	X		X				X		X		X			

	PHYSICAL RECEPTORS							BIOLOGICAL RECEPTORS			SOCIOECONOMIC RECEPTORS				
	Air Quality	Climate Change	Geology and Soil	Acoustic	Hydrology	Groundwater	Landscape & Visual	Terrestrial Ecology & Habitats	Protected areas	Sensitive species	Economy, Employment & Income	Local Infrastructure, & Services	Community Heatlth & Safety	Land Use & Ecosystem Services	Project Workers
Routine inspections and site maintenance and security	X	X	X	X	X										
Routine road maintenance	X	X		X	X										
Resource consumption (water, energy, etc.)															
Dry cleaning of the PV modules using a robotic system		X													
Waste and wastewater management			X		X										
Remote monitoring of the power generation performance															
Decommissioning *															
Removal, recycling/disposal of surface structures	X		X	X	X		X	X		X				X	
Movement of vehicles, equipment, personnel	X	X	X	X	X			X		X	X	X	X		X
Storage and handling of fuels and chemicals		X	X	X	X										
Treatment and disposal of wastes	X		X	X	X										
Reinstatement and restoration of the affected sites	X		X	X	X		X	X		X				X	
Accidental and non-routine Events															
Large/Major Leaks/Spills of Oil, Fuel, Chemicals and Wastes during Project Activities	X	X	X		X		X	X							
Increased Risk of Accidents and Injuries related to Project Road Traffic	X	X											X		
Natural Hazards / Events		X	X		X										
Malfunction of Project Components													X		
Aviation Incident with Solar PV Farm							X						X		

*Note that if instead of the decommissioning phase the repowering phase were to be carried out, activities similar to both the construction and decommissioning phases would be carried out (replacement of PV panels or power inverters with those of an operational solar power plant, infrastructure repair or replacement, etc.).

7.5 ENVIRONMENTAL IMPACT ASSESSMENT

The following sections present the assessment of the potential physical and biological impacts that may result from routine Project activities throughout its lifecycle (Project Construction, Pre-commissioning and Commissioning, Operations and Maintenance, Decommissioning or Repowering) as defined in Chapter 3 - Project Description. Impacts derived from non-routine (unplanned events) are presented in section 7.7. These activities are:

- Construction/pre-commissioning/commissioning and repowering phase:
  - Site preparation: including clearing, grading, and levelling to create flat land;
  - Construction of temporary construction compound, lay-down area and guardhouse;
  - Construction of internal roads and drainage system (as required), inter-linking the external site access road, panels' locations and step-up substation;
  - Installation of security fencing and security system around the Project site;
  - Vehicle movement, including road transportation of project components from Sohar Port to the site;
  - Influx of workers;
  - Installation of inverters, transformers, PV panels and their foundations, step-up substation, meteorological stations, electrical infrastructure and signal cables;
  - Excavation of trenches for cable laying;
  - Resource consumption (water, energy, etc.);
  - Waste and wastewater management;
  - Removal of construction equipment and temporary facilities and reinstatement; and
  - Commissioning of site equipment.
- Operational phase:
  - Workers management;
  - Vehicle movement;
  - Routine inspections and site maintenance and security;
  - Routine road maintenance;
  - Resource consumption (water, energy, etc.);
  - Dry cleaning the PV modules using a robotic system (automatic cleaning system);
  - Waste and wastewater management;
  - Remote monitoring of the power generation performance.
- Decommissioning Phase:
  - Removal, recycling/disposal of surface structures
  - Movement of vehicles, equipment, personnel
  - Storage and handling of fuels and chemicals
  - Treatment and disposal of wastes
  - Reinstatement and restoration of the affected sites

Decommissioning will generate traffic associated with worker movements, disassembly of solar panels, and transport of materials away from the site, along with temporary or permanent

road infrastructure improvements necessary to facilitate those activities. Overall, it is assumed that decommissioning will result in impacts similar in character and significance to those identified for the construction phase but over a shorter period (i.e. 3 months). Because detailed decommissioning plans will not be available for many years, further evaluation of this phase should be made in the future.

If instead of the decommissioning phase the repowering phase were to be carried out, activities similar to both the construction and decommissioning phases would be carried out (replacement of PV panels or power inverters with those of an operational solar power plant, infrastructure repair or replacement, etc.).

The above activities were evaluated against the different receptors in the impact assessment matrix (Section 7.4), identifying potential impacts. Thus, in the following sections only the activities affecting each receptor are assessed.

7.5.1 GEOLOGY AND SOILS

7.5.1.1 SCOPE OF THE ASSESSMENT

This section is a limited assessment of the following Project activities' potential impacts on geology and soils:

Project phase	Activity with potential impact
Construction	• Site preparation: including clearing, grading, and levelling to create flat land. • Construction of temporary construction compound, lay-down area and guardhouse; • Construction of internal roads and drainage system (as required), inter-linking the external site access road, panels' locations and step-up substation; • Installation of security fencing and security system around the Project site; • Vehicle movement, including road transportation of project components from Sohar Port to the site; • Installation of inverters, transformers, PV panels and their foundations, step-up substation, meteorological stations, electrical infrastructure and signal cables; • Excavation of trenches for cable laying; • Waste and wastewater management; • Removal of construction equipment and temporary facilities and reinstatement;
Operation	• Routine inspections and site maintenance and security; and • Waste and wastewater management.
Decommissioning	• Removal, recycling/disposal of surface structures • Movement of vehicles, equipment, personnel • Storage and handling of fuels and chemicals • Treatment and disposal of wastes • Reinstatement and restoration of the affected sites
Repowering	Similar to Construction and Decommissioning phases

7.5.1.2 SENSITIVITY OF THE RECEPTOR

According to Section 6.1.6, soil across the Project site can be described as silty sand with gravel down to around 20 – 30 cm below ground level, which becomes increasing more compacted and cemented from 0.3 m – 5 m to form weak to moderately strong siltstone or

mudstone, with a significant gypsum content in many places. Environments with deflated soil are generally erosional, despite the low incidents of rainfall.

Single vehicle tracks may remain visible for many years, even decades. This is evident in satellite imagery of the site where particular vehicle tracks from seismic surveys and camel herding activities are visible in imagery of the area.

During site surveys, no area of visible soil contamination was observed, which together with the laboratory analysis and the generally undeveloped nature of the Project site, it reasonable to conclude that soil on site is uncontaminated.

Although the soil of the site shows some signs of stress such as erosion, this is typical of desertic soils so it can be said that the soil is within its natural conditions. Therefore, sensitivity of the geology and soil is considered **low** following Table 7.5 criteria.

7.5.1.3 CONSTRUCTION PHASE

Ground surface disturbance will occur during the construction and installation of access roads, inverters, transformers, PV panels and their foundations, step-up substation, meteorological stations, electrical infrastructure and signal cables, underground cables, security fencing, security system other on-site structures. The expected project construction land take is 206.84 ha during a period of 17 months (See Section 3.12.1).

Heavy vehicles can disturb or destroy originally stable soil conditions and increase the effects of soil erosion caused by both wind and surface runoff. Also, there will be heavy plant and machinery on site, and this will result in the need to store oils and diesel. There is a potential for minor accidental spillages and leaks linked to routine activites such as storage, refilling, and maintenance operations. Accidental large-scale leaks or spills are assessed in section 7.7.

Also, project excavations can result in cross-contamination of existing soils. However, this is unlikely given that, as already indicated in Section 6.1.6.4, there appears to be no previous contamination at the site.

A study from Luo L. et al (2023) indicates that chemical elements in the soil within the PV plants can be modified, showing elevated increases in certain elements compared to natural soil conditions. However, this same study showed that the vegetation has grown well due to the shading, wind-sheltering, and water accumulation effects of the panels.

Furthermore, project construction would generate solid non-hazardous and hazardous waste, as well as potential liquid wastes resulting from sanitary waste streams. On the management and handling of hazardous waste, although the hazardous fraction of construction waste such as used oil, machinery lubricants and paints, etc. will represent a very small proportion of the total amount, it would require special attention for management and disposal. If the temporary storage and handling of construction waste is inadequate prior to being removed for disposal, or if inadequate waste management procedures are followed, the risk of impact to soil quality increases.

Impact significance

TABLE 7.12 IMPACT ASSESSMENT SUMMARY: SOIL COMPACTION AND DECREASE OF SOIL QUALITY PRE-MITIGATION

Impact	**Increase of soil compaction and decrease of soil quality**			
Nature	Negative	Positive	Neutral	
Type	Direct	Indirect	Induced	
Duration	Temporary	Short term	Long term	Permanent
Extent	Local	Regional	National	International
Scale	Not distinguishable	Distinguishable	Evident	Major
Frequency	One-off	Intermittent	Continuous	
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low	Medium	High	
Significance	Not Significant	Minor	Moderate	Major

TABLE 7.13 IMPACT ASSESSMENT SUMMARY: LOCALISED SOIL CONTAMINATION (MINOR SPILLS) PRE-MITIGATION

Impact	**Minor leaks/spills**			
Nature	Negative	Positive	Neutral	
Type	Direct	Indirect	Induced	
Duration	Temporary	Short term	Long term	Permanent
Extent	Local	Regional	National	International
Scale	Not distinguishable	Distinguishable	Evident	Major
Frequency	One-off	Intermittent	Continuous	
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low	Medium	High	
Significance	Not Significant	Minor	Moderate	Major

Mitigation/Management Measures

The following mitigation measures relating to geology and soils during Construction Phase are proposed and will be managed through the Project's Construction Environmental Management and Monitoring Plan (CEMMP), Hazardous Materials Management Plan, Waste Management Plan

(WMP), Pollution Prevention and Control Plan (PPCP), Traffic Management Plan (TMP) and Water/Wastewater Management Plan (WWMP):

- The CEMMP will include measures related to erosion control.
- All construction equipment and workers will be restricted to the construction site footprint and temporary laydown area (See Figure 3.2 Project Layout). Adjacent storage and activity outside of these areas will require authorisation by PDO.
- Soil from areas where there are potential sources of contamination such as substations and diesel generators, as well as other potential sources of contamination shall be covered with reinforced concrete, in order to prevent the seepage of contaminants into the ground (EA permit condition, October 2024).
- Infill material will be preferentially sourced from within the Project site.
- Temporary stockpiles of excess excavated material will be stored in areas to avoid interruption of surface drainage.
- All excavated material will be considered for re-use in coordination with PDO.
- Excavated holes and trenches will be infilled in a timely manner (i.e. in line with the agreed work schedule) to minimise potential for erosion and disruption to potential surface flows.
- Should there be a need to store excess material on site, it will be stockpiled separately in order to avoid the mixing of soil types and facilitate subsequent soil replacement and site restoration. This measure must be implemented in coordination with other measures after a feasibility analysis by the TTE technical team. According to the Bureau de Recherches Géologiques et Minières, there is only one soil type in the area (Gypsiorthids). However, if during the works another soil type is found in the area, this measure would come into action.
- Vehicle traffic and earthmoving equipment will be restricted to designated roads, tracks, and laydown areas. These will be detailed in the Traffic Management Plan. For speed limitations, see mitigation measures in Sections 7.5.3 and 7.5.4.
- All workshops and equipment laydown areas containing hazardous substances (e.g. fuel) must be appropriately bunded and contain spill kits. This will be detailed in the Hazardous Materials Management Plan and Pollution Prevention & Control Plan.
- Designated workers on site will be trained in handling, clean-up and disposal of solid and liquid wastes, including notification and record keeping of such incidents.
- A Water and Wastewater Management Plan shall be prepared for the construction and operational phases of the project to adequately manage effluents. A copy of this plan shall be held on site, and approved by the concerned stakeholders.
- A Pollution Prevention and Control Plan shall be put in place to minimize spills arising from on-re-fuelling and replacement of hydraulic fluid, lube oil and oil filters. This plan will also identify where hazardous materials and wastes are stored on site, spill prevention measures to be implemented, training requirements, appropriate spill response actions for each material or waste, the locations of spill response kits on site, a procedure for ensuring that the spill response kits are always adequately stocked, and procedures for making timely notifications to authorities.
- A Waste Management Plan shall be prepared for the construction and operational phases of the project. A copy of this plan shall be held on site, and approved by the concerned stakeholders.

- All waste will be segregated and managed in accordance with the waste hierarchy and the availability of corresponding facilities for recycling or other management options for segregated materials.
- All domestic waste to be appropriately stored in covered skips and disposed of regularly (not less than monthly) using a government approved waste transport contractor to the most appropriate licensed waste disposal facility.
- All hazardous wastes shall be segregated and appropriately stored and disposed of regularly (not less than monthly) using a government approved waste transporter to the licensed waste storage facility at Qarn Alam or for disposal a the hazardous waste facility at Sohar (Beah).
- Disposal consignment notes (detailing disposal method, date, volumes, and type) must be obtained and kept for all waste disposal.

- A documented inventory of all hazardous substances (with supporting Material Safety Data Sheets) used and temporarily stored will be maintained and available on site at all times as per the Hazardous Materials Management Plan.
- A copy of the Construction Environmental Management and Monitoring Plan and or the EPC Environmental, Safety and Health (ESH) Management Plan will be available on site.
- During construction works, a designated focal point will be stationed on site during work hours to co-ordinate any public interaction (e.g. queries, feedback and complaints). Immediate neighbours to the work area will be notified at the start and end of construction activities. Immediate neighbours will be advised on how to use the Grievance Mechanism before construction begins.

Residual Impact Significance

After application of mitigation measures, residual impact significance of both " Increase of soil compaction and decrease of soil quality" and "Minor spills/leaks" is considered **Not significance.**

7.5.1.4 OPERATION

Impacts on the geology and soils related to on-site activities, vehicle movement; and routine road maintenance will remain relevant during this phase. Resource consumption is not expected to have an impact on geology and soils, in contrast to waste and wastewater management.

During the operation and maintenance phase there will be the need to store and use oils, greases and other substances on site. This will create the potential for minor accidental spillages. Accidental large-scale leaks or spills are assessed in section 7.8.

Routine inspections and site maintenance and security activities may continue to impact non-impacted soil areas during surveillance and security tasks, having to deviate from constructed roads for specific inspections. Finally, waste and wastewater management can have an impact on the quality of the soils if inadequately implemented.

Impact Significance

The significance of impacts during operational phase are considered minor, same as during construction, assessed in Section 7.5.1.3.

Mitigation Measures

The following mitigation measures relating to geology and soils during Operation Phase are proposed:

- On-site monitoring and quantification of airborne contaminants and their accumulation in washwater (transboundary contamination depositing on the PV panels) will be routinely conducted over the operational period and the results shared with EA.
- Hazardous wastes will be disposed of by a government approved licensed third-party contractor.
- Hazardous substances (e.g. lubricating oils) shall be securely stored in a designated enclosed area with secondary containment within the solar site.
- Wastes (e.g. oily rags) will be segregated to ensure no cross contamination of non-hazardous wastes (e.g. packaging) and to ensure maximisation of potentially recyclable wastes.
- Glass and non-hazardous e-wastes (e.g. broken or faulty PV panels) will be safely disposed of in an approved landfill (Be'ah).

Furthermore, measures not specific to construction proposed in Section 7.5.1.3 can also be applicable.

Residual Impact Significance

As per Section 7.5.1.3.

7.5.1.5 DECOMMISSIONING/REPOWERING PHASE

Significance of impacts during Decommissioning/Repowering Phase is considered as per Construction Phase (Section 7.5.1.3). Overall, it is assumed that decommissioning or repowering will result in impacts similar in character and significance to those identified for the construction phase but over a shorter period. These impacts will be managed through the Decommissioning Management Plan or assessed later if repowering is the selected option (the Design Change Management Procedure will be applied).

Repowering (i.e., replacement of solar panels at the end of the design life, and potentially other project elements) will be potentially undertaken by PDO after the project is handed over to them under the BOOT model, which would extend the operational life of the project. Should PDO elect to re-power the project, it is recommended that EA is re-engaged by PDO to understand EA's requirements in terms of updating the environmental permit to the project and to clarify the mechanism for meeting their requirements with respect to the assessment of environmental impact.

7.5.1.6 SOIL IMPACTS SUMMARY

A summary of the effects on soil is presented in Table 7.14.

TABLE 7.14 SOIL IMPACTS SUMMARY

Receptor	Significance (including inherent and design mitigation and management)							
	Construction/Decommissioning/Repowering Phase				Operation Phase			
	Increase of soil compaction and decrease of soil quality		Minor spills/leaks		Increase of soil compaction and decrease of soil quality		Minor spills/leaks	
	Pre-mitigation	Residual	Pre-mitigation	Residual	Pre-mitigation	Residual	Pre-mitigation	Residual
Geology and Soil	Minor	Not Significant	Minor	Not Significant	Minor	Not Significant	Minor	Not Significant

7.5.2 HYDROLOGY

7.5.2.1 SCOPE OF THE ASSESSMENT

This section is a limited assessment of the following Project activities potential impacts on surface water (note that impacts on groundwater have been scoped out as per Section 7.3):

Project phase	Activity with potential impact
Construction	• Site preparation: including clearing, grading, and levelling to create flat land; • Construction of temporary construction compound, lay-down area and guardhouse; • Construction of internal roads and drainage system (as required), inter-linking the external site access road, panels' locations and step-up substation; • Installation of security fencing and security system around the Project site; • Vehicle movement, including road transportation of project components from Sohar Port to the site; • Installation of inverters, transformers, PV panels and their foundations, step-up substation, meteorological stations, electrical infrastructure and signal cables; • Excavation of trenches for cable laying; • Waste and wastewater management; and • Removal of construction equipment and temporary facilities and reinstatement.
Operation	• Routine inspections and site maintenance and security; • Routine road maintenance; and • Waste and wastewater management.
Decommissioning	• Removal, recycling/disposal of surface structures • Movement of vehicles, equipment, personnel • Storage and handling of fuels and chemicals • Treatment and disposal of wastes • Reinstatement and restoration of the affected sites
Repowering	Similar to Construction and Decommissioning phases

7.5.2.2 SENSITIVITY OF THE RECEPTOR

Following Section 6.1.8, The Project site contains no permanent natural surface water features. The site drains to its southeast corner, where runoff joins a more developed wadi system. Therefore, due to the absence of permanent water bodies, sensitivity of Hydrology in the AoI of the Project can be considered as **low**.

7.5.2.3 CONSTRUCTION PHASE

Construction of the Project will require grading trenching and backfilling for buried infrastructure such as collector cables, and the construction of access, perimetral and internal roads will obstruct natural drainage lines, resulting in changes to the natural flow of storm water from the Project site. Rainfall is infrequent, but the site periodically experiences intense rainfall events, mostly during cyclonic storms.

These activities will also expose Project soils (e.g., sands, gravels) disturbed and/or stockpiled from earthworks / levelling such that they are subject to erosion by wind and stormwater runoff. Additionally, site grading could modify the runoff and alter the existing hydro-morphology of the Project site, causing ponding.

According to the hydrological assessment carried out by Worley Consulting at 11 June 2024, the proposed PV site is free of flooding with the exception of depressions to the west and north of the site associated with borrow pits, internal wadi flow paths through the south of the site and inflows from an external major wadi flow path. These generate both shallow expansive flooding, as well as areas of deeper flow depths in the centre of the channels. However, sufficient flood free areas exist to accommodate the PV plant.

Pollution of surface water due to wastes, wastewater and minor leaks and spills could occur due to poor management, affecting main wadi system located SE of Project area. However, pollution is not likely to occur as works are expected to take place in dry, approved sites. Equally, the assessment and mitigation measures taken in Section 7.5.1.3 are applicable. Accidental large-scale leaks or spills are assessed in section 7.7.

Impact significance

TABLE 7.15 IMPACT ASSESSMENT SUMMARY: CHANGES TO DRAINAGE AND SURFACE WATER FLOWS DURING CONSTRUCTION

Impact	**Changes to drainage and surface water flows during construction**			
Nature	Negative	Positive	Neutral	
Type	Direct	Indirect	Induced	
Duration	Temporary	Short term	Long term	Permanent
Extent	Local	Regional	National	International
Scale	Not distinguishable	Distinguishable	Evident	Major
Frequency	One-off	Intermittent	Continuous	
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low	Medium	High	
Significance	Not Significant	Minor	Moderate	Major

Mitigation/Management Measures

Many of the mitigation measures already proposed in section 7.5.1.3 have a direct influence on reducing impacts on the hydrology of the site. Similarly, the following measures are proposed:

Design/Preconstruction measues:

- Potential soil erosion will be controlled at culvert outlets with appropriate structures. Catch basins, roadway ditches, and culverts will be cleaned and maintained regularly. This mitigation measure is subject to the hydrological study recommendations.

- On-site surface runoff control features will be designed to minimize the potential for increased localized soil erosion. Drainage ditches will be constructed where necessary but held to a minimum.
- Remaining drainage works and road construction will be done in a manner that minimizes erosion risk.
- Some locations where the interaction between predicted floodwater and proposed site facilities will require mitigation works to minimize flood risk:
    - Relocation – this will eliminate the risk of flooding by shifting the at-risk infrastructure to areas of low risk. This is the preferred option as it minimizes the cost of flood protection measures.
    - Protection – this will require design of flood protection measures to mitigate against flood risk. These have been specified as an alternative in the case where relocation is not feasible. Protection measures include backfill of depressions, raising of equipment and Irish type crossings.
- Industrial yard and camp plot: provide perimeter bunds and drains and include internal drainage systems.
- Reinstatement of the topography of the of temporary construction areas as far as feasible.

Residual Impact Significance

After the mitigation measures, changes to drainage and surface water flows during construction remains **Minor** as flood protection measures could still produce minor significance impacts on drainage lines of project area.

7.5.2.4 OPERATION PHASE

Following construction, the Project will include a number of areas with low permeability surfaces e.g., internal road network, solar module foundations. This increase in relatively impermeable surfaces may marginally increase peak surface water runoff rates. However, these effects arising from the construction of the project components is assessed in section 7.5.2.3.

Specifically due to the operational phase, the impacts derive from the restoration of the Temporary Site Facilities and Laydown areas which could damage the soil profile and lead to localized surface water ponding.

According to Cook et al. (2013), solar panels themselves don’t show a significant effect on the runoff volumes, peaks, or times to peak. However, if the ground cover under the panels is gravel or bare ground, owing to design decisions or lack of maintenance, the peak discharge may increase significantly with storm-water management needed.

Pollution of surface water due to wastes, wastewater and minor leaks and spills could occur due to poor management, affecting main wadi system running SE of the Project area. However, pollution is not likely to occur as works are expected to take place in dry, approved sites. Equally, mitigation measures listed in Section 7.5.1.3 are applicable. Accidental large-scale leaks or spills are assessed in section 7.7.

Impact significance

TABLE 7.16 IMPACT ASSESSMENT SUMMARY: CHANGES TO DRAINAGE AND SURFACE WATER FLOWS DURING OPERATION

Impact	**Changes to drainage and surface water flows during operation**				
Nature	Negative	Positive	Neutral		
Type	Direct	Indirect	Induced		
Duration	Temporary	Short term	Long term	Permanent	
Extent	Local	Regional	National	International	
Scale	Not distinguishable	Distinguishable	Evident	Major	
Frequency	One-off	Intermittent	Continuous		
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low	Medium	High		
Significance	Not Significant	Minor	Moderate	Major	

Mitigation/Management Measures

Catch basins, roadway ditches, and culverts will be cleaned and maintained regularly. This mitigation measure is subject to the hydrological study recommendations.

Residual Impact Significance

After proposed mitigation measure, the impact becomes **Not Significant** as no change is foreseen in drainage and surface water flows.

7.5.2.5 DECOMMISSIONING/REPOWERING PHASE

Significance of impacts during Decommissioning/Repowering Phase is considered as per Construction Phase (Section 7.5.2.3). Overall, it is assumed that decommissioning or repowering will result in impacts similar in character and significance to those identified for the construction phase but over a shorter period. Impacts related to this phase will be managed through the Decommissioning Management Plan or assessed later if repowering is the selected option (the Design Change Management Procedure will be applied).

Repowering (i.e., replacement of solar panels at the end of the design life, and potentially other project elements) will be potentially undertaken by PDO after the project is handed over to them under the BOOT model, which would extend the operational life of the project. Should PDO elect to re-power the project, it is recommended that EA is re-engaged by PDO to understand EA's requirements in terms of updating the environmental permit to the project and to clarify the mechanism for meeting their requirements with respect to the assessment of environmental impact.

7.5.2.6 SURFACE WATER IMPACTS SUMMARY

A summary of the effects on surface water is presented in Table 7.17.

TABLE 7.17 HYDROLOGY IMPACTS SUMMARY

Receptor	Significance (including inherent and design mitigation and management)			
	Construction/Decommissioning/Repowering Phase		Operation Phase	
	Changes to drainage and surface water flows during construction/Decommissioning/ Repowering		Changes to drainage and surface water flows during operation	
	Pre-mitigation	Residual	Pre-mitigation	Residual
Hydrology	Minor	Minor	Minor	Not Significant

7.5.3 AIR QUALITY

7.5.3.1 SCOPE OF THE ASSESSMENT

This section is a limited assessment of the following Project activities' potential impacts on air quality:

Project phase	Activity with potential impact
Construction	• Site preparation: including clearing, grading, and levelling to create flat land; • Construction of temporary construction compound, lay-down area and guardhouse; • Construction of internal roads and drainage system (as required), inter-linking the external site access road, panels' locations and step-up substation; • Vehicle movement, including road transportation of project components from Sohar Port to the site ; • Influx of workers; • Installation of inverters, transformers, PV panels and their foundations, step-up substation, meteorological stations, electrical infrastructure and signal cables; • Excavation of trenches for cable laying; • Resource consumption (water, energy, etc.); • Removal of construction equipment and temporary facilities and reinstatement; and • Commissioning of site equipment.
Operation	• Vehicle movement; • Routine inspections and site maintenance and security; and • Routine road maintenance
Decommissioning	• Removal, recycling/disposal of surface structures; • Movement of vehicles, equipment, personnel; • Treatment and disposal of wastes; and • Reinstatement and restoration of the affected sites.
Repowering	Similar to Construction and Decommissioning phases

7.5.3.2 SENSITIVITY OF THE RECEPTOR

The Project site is situated in a quiet and relatively remote, rural area. There are no permanent settlements within 1km of the Project site. The area is accessed by camels for grazing infrequently and short-term. Taking into account the long distance that particulates can travel, the receptor sensitivity is considered to be **Low to Medium**.

7.5.3.3 CONSTRUCTION/DECOMMISSIONING/REPOWERING – AIRBORNE EMISSIONS CAUSED BY SITE PREPARATION AND WORKS

Construction dust impacts have been assessed qualitatively to identify the potential for significant impacts and inform the requirement for mitigation to control emissions. The largest source of emissions affecting air quality will be fugitive dust from construction activities, including construction traffic movements. The methodology for the decommissioning/repowering phase will be the same as for the construction phase and it can be assumed that each aspect of the assessment will be the similar. This methodology applies to the following dust emissions sources:

- Earth moving activities and ground preparation (no demolition is expected);
- Movement of vehicles over open-ground on-site and on unpaved roads to and from the site;

- Concrete batching;
- Handling of dusty materials; and
- Stockpiling

The Project site is desert and is characterised by dry, dusty ground conditions and can be particularly dusty when disturbed by vehicle movements. Any moisture in the material, or applied by water sprays, rapidly evaporates due to the high temperatures and low moisture content in the air, and therefore attenuation of dust due to the presence of water is minimal. Use of water for dust abatement is also not favoured in this type of environment due to water scarcity.

Any dust generated will remain airborne and travel considerable distances. Research undertaken by the Desert Research Institute (2010)[1] states:

"Based on gravitational setting velocities that apply to particles with aerodynamic diameters >~2 µm (Slinn, 1982), … half of the 10 µm particles mixed within the first meter are removed after ~3.5 minutes, and that half of the 2.5 µm particles in this layer are gone after an hour. Less than 10% of the 10 µm particles remain after 12 minutes, with 90% of the 2.5 µm particles depleted after 3.5 hours. A 1 m/s wind speed results in a transport distance of 3.6 km/hr. In an average 5 m/s wind, only 10% of the 10 µm particles uniformly mixed through a 10 m depth would travel more than 36 km from the source within two hours after suspension, while 10% of the 2.5 µm particles could achieve distances of nearly 600 km".

On the basis of the above it is clear that emissions of particulates from fugitive sources are able to travel very considerable distances from source.

The United States Environmental Protection Agency (USEPA)[2] states that precipitation of greater than 0.2 mm/hr will effectively attenuate dust, and wind speeds of > 5.3 m/s are typically required to lift dust from open surfaces. This will be lower for dust generated by mechanical means (ie during excavation and due to the movement of vehicles over unpaved surfaces), at around 3 m/s. In the vicinity of the Project, there is very little rainfall, and elevated wind speeds are frequent, and on this basis natural attenuation of dust is minimal.

Magnitude of Impact

Construction areas within the Project site (i.e. solar panels area and access road corridors) are limited and dispersed, and the construction/decommisioning activities local and short-term, so the magnitude of impact is considered to be Small.

In addition there may be use of an emergency generator onsite during construction. This would likely be small and therefore of negligible impact.

[1] Desert Research Institute (2010) Measurement System Evaluation for Fugitive Dust Emissions Detection and quantification
[2] United States Environmental Protection Agency (1995) AP-42 Section 13.2 Fugitive dust sources http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s02.pdf

Impact significance

TABLE 7.18 IMPACT ASSESSMENT SUMMARY: CONSTRUCTION DUST (AND DECOMMISSIONING/REPOWERING)

Impact	**Construction/Decommissioning/Repowering Dust - Air Quality**				
Nature	Negative	Positive	Neutral		
Type	Direct	Indirect	Induced		
Duration	Temporary	Short term	Long term	Permanent	
Extent	Local	Regional	National	International	
Scale	Not distinguishable	Distinguishable	Evident	Major	
Frequency	One-off	Intermittent	Continuous		
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low	Medium	High		
Significance	Not Significant	Minor	Moderate	Major	

Note: Not significant based on the implementation of the mitigation outlined above.

Mitigation Measures

Mitigation should be implemented in response to the predicted impacts from dust generation during construction. This is determined by the level of on-site activity and the prevailing weather conditions, particularly when windy. A number of mitigation measures are identified to control emissions of dust and PM_{10}. These mitigation measures take into consideration the local conditions, and the fact that certain techniques, for example vegetating and watering will not be possible due to the local conditions and water scarcity.

In terms of construction activities, a number of mitigation measures are recommended and will be incorporated into the Construction Environmental Management and Monitoring Plan:

- The company must control the emission of pollutants, dust, unpleasant odors, and other environmental nuisances from storage and handling areas, and adhere to environmental practices and regulations established by the Authority (**EA**'s Local permit condition, October 2024).
- International best practice([1]) dust control measures, such as using covers when transporting or storing stock-piled materials, will be followed to suppress dust emissions.
- If required, wind breaks should be erected around the key construction activities, and, if possible, in the vicinity of potentially dusty works;
- Use of localised dampening and activity specific dampening should be used to reduce localised emissions of dust;

[1] IFC EHS General Guidelines

- Dust will be minimised through wet suppression of unpaved access and site roads during moderate (Beaufort 4) and higher wind speeds (Beaufort 4+) to avoid potential for adverse impact on offsite receptors e.g. traffic. Dust is recognised by OPAL as an HSE hazard for traffic using unpaved roads.
- Earthmoving or excavation works will cease in unfavourable weather conditions (i.e. strong winds – Beaufort 6+) if wind speeds pose a health and safety conditions risk due to dust generation.
- With the exception of loading / unloading, vehicles transporting loose aggregate will be appropriately covered to avoid generation of windborne material.
- Applicable OPAL's Road Safety Standard speed limits will be imposed on unpaved roads and a safe speed limit on site will be set by the company HSE team taking into consideration the need to minimise dust generation.
- All loaded materials transported offsite that have the potential to generate dust will have appropriate mitigation measures to control dust (i.e. covered), prior to the material leaving the site. This will be included as part of a Traffic Management Plan.
- Hard surfaces (e.g gravels made of crushed rock) will be established on site to assist in managing dust from construction roads and entrances and to mitigate against future erosion.
- Measures to minimise dust will be discussed at on site toolbox talks. The resident engineer, site managers, supervisors are to be made aware of dust as an environmental (and health and safety) issue, and instruct labourers accordingly.
- Use of modern equipment and vehicles meeting appropriate emissions standards, and regular preventative maintenance (in line with manufacturer's recommended maintenance schedules, considering intensity of use and operating environment).
- Excavation, handling, and transport of erodible materials shall be avoided under high wind conditions where practicable. Where not feasible, transported erodible materials shall be covered.
- Drop heights of material when stockpiling should be minimised
- Where stockpiles are in use, the design should be optimised to retain a low profile with no sharp changes in shape, avoiding surpassing heights that could compromise the stability of the stockpile leading to erosion or collapse, and designing slopes at angles that maintain structural integrity, often recommended between 20-30 degrees depending on the material.
- Where ground and earthworks are exposed, these areas should be covered as far as possible, for example with sheeting or boarding, or if necessary the use of chemical binders investigated;
- Where ground and earthworks are covered or surface binders are used, the smallest possible area for working should be exposed;
- Stockpiling of material, for example, topsoil and sand should be minimised;
- Stockpiles shall be located as far away as possible from receptors;

Residual Impact Significance

In terms of the construction phase, the mitigation as described above should reduce impacts of TSP, PM_{10}, $PM_{2.5}$. The implementation of these mitigation measures should render residual impacts negligible, or at worst, minor.

7.5.3.4 CONSTRUCTION, OPERATIONAL AND DECOMMISSIONING/REPOWERING TRAFFIC IMPACTS AIR QUALITY

Methodology

Traffic for the construction, operational and decommissioning/repowering phases is assessed initially through a methodology based on IFC guidelines which defines the emission category (Table 7.19). The methodology is based upon the calculated increases in vehicles needed to trigger the significance thresholds based upon the interpretation of the IFCs significance criteria and expert judgement with regards to local baseline air quality and traffic conditions.

TABLE 7.19 CONSTRUCTION AND OPERATION TRAFFIC EMISSION CATEGORY

Type of Traffic	**Number of Movements, AADT (Annual Average Daily Traffic)**	**Emission Category**	
		Undegraded	**Degraded**
HDV	<220	Negligible	Negligible
	<440	Negligible	Small
	<1100	Small	Medium
	<3300	Medium	Large
	>3300	Large	Large
LDV	<3800	Negligible	Negligible
	<7600	Negligible	Small
	<19000	Small	Medium
	<57000	Medium	Large
	>57000	Large	Large

HDV = Heavy Duty Vehicle i.e. goods vehicles + buses >3.5t gross vehicle weight

LDV = Light Duty Vehicle i.e. cars and small vans <3.5t gross vehicle weight

There is currently no data available on the number of HGVs anticipated to be accessing the site. However, the works in any one location are not anticipated to be generating more than 440 HGVs/day, given that the amount of construction materials is, relatively, small.

Construction Phase

It is known that for construction phase roughly 500 employees are likely to be present at peak time of construction at the site. Based on the criteria above and assuming worst case that each employee travels in their own LDV, this is much less than the screening level for LDVs for an undegraded airshed and therefore we would anticipate that construction traffic impacts would be negligible and therefore not significant.

Operational Phase

For operational traffic there are predicted to be 10 full time staff on site at any time. As such, assuming each person travelled in one vehicle the impact from operational traffic would be negligible and therefore not significant according to the criteria.

Decommissioning/Repowering Phase

For decommissioning or repowering traffic, it is anticipated that numbers will be similar to the construction phase. Based on the criteria above and assuming worst case, this would still be less than the screening level for an undegraded airshed and therefore we would anticipate that traffic impacts would be negligible and therefore not significant in these phases. Impacts related to this phase will be managed through a Decommissioning Plan or assessed later if repowering is the selected option (the Design Change Management Procedure will be applied). Decommissioning Plan will be prepared in line with legal requirements and international best practice at the time of execution.

Repowering (i.e., replacement of solar panels at the end of the design life, and potentially other project elements) will be potentially undertaken by PDO after the project is handed over to them under the BOOT model, which would extend the operational life of the project. Should PDO elect to re-power the project, it is recommended that EA is re-engaged by PDO to understand EA's requirements in terms of updating the environmental permit to the project and to clarify the mechanism for meeting their requirements with respect to the assessment of environmental impact.

7.5.3.5 OPERATIONAL – AIRBORNE EMISSIONS

It is assumed that other than the operational traffic discussed above that there are no additional sources of airborne emissions from the operational phase of the project.

7.5.3.6 AIR QUALITY IMPACT SUMMARY

TABLE 7.20 SUMMARY OF EFFECTS ON AIR QUALITY

Impact	Project Phase	Significance (including inherent and design mitigation and management)	
		Human receptors	
		Pre-mitigation (without embedded mitigation)	Residual
Dust and Emissions	Construction/Decommissioning/Repowering	Minor to Medium (project will not be undertaken without mitigation)	Not Significant to Minor Impact
Construction Traffic	Construction	Not Significant	Not Significant
Operational Traffic	Operation	Not Significant	Not Significant
Decommissioning Traffic	Decommissioning/Repowering	Not Significant	Not Significant

7.5.4 ACOUSTICS

7.5.4.1 SCOPE OF THE ASSESSMENT

This section assesses the following Project activities that have the potential to impact the acoustic environment of the Project site and surrounding communities.

Project phase	Activity with potential impact
Construction	• Site preparation: including clearing, grading, and levelling to create flat land • Construction of temporary construction compound, lay-down area and guardhouse • Construction of internal roads and drainage system (as required), inter-linking the external site access road, panels' locations and step-up substation • Installation of security fencing and security system around the Project site • Vehicle movement, including road transportation of project components from Sohar Port to the site. • Installation of inverters, transformers, PV panels and their foundations, step-up substation, meteorological stations, electrical infrastructure and signal cables • Excavation of trenches for cable laying; • Waste and wastewater management; and • Removal of construction equipment and temporary facilities and reinstatement.
Operation	During operation low noise emissions are anticipated due to operation of the transformers. Given the low noise emissions and the great distance (more than 5 km) between the nearest receptors and the project area, operational noise has been scoped out.
Decommissioning	• Removal, recycling/disposal of surface structures; • Movement of vehicles, equipment, personnel ; • Storage and handling of fuels and chemicals; • Treatment and disposal of wastes; and • Reinstatement and restoration of the affected sites.
Repowering	Similar to Construction and Decommissioning phases

Noise during decommissioning would be of a similar nature to that of construction and will be managed through a Decommissioning Management Plan or assessed later if repowering is the selected option (the Design Change Management Procedure will be applied). Decommissioning Management Plan will be developed in line with best practice or other guidance or legislation relevant at the time.

7.5.4.2 SENSITIVITY OF THE RECEPTOR

The Project site is situated in a quiet and relatively remote, rural area in the desert. There are no permanent settlements within 5km of the Project site. The area is accessed by camels for grazing infrequently and short-term. Taking into account the long distance from the project's boundariesthe receptor sensitivity is considered to be Low.

7.5.4.3 CONSTRUCTION PHASE

During construction, noise may result from the use of plant and machinery to carry out construction activities for the site clearance and installation of the panels.

Impact significance

Construction works will be limited in duration, however, due to the substantial (5 km) separation distance between the project area and the nearest receptors, noise effects are unlikely to occur. Best practice mitigation measures will be adopted to manage noise emissions during construction, including restrictions on construction working hours confined to working hours, and further controlled through the application of good practice measures, ensuring the acoustic effects of construction works are Not Significant.

TABLE 7.21 IMPACT ASSESSMENT SUMMARY: CONSTRUCTION NOISE IMPACT

Impact	**Construction Noise Impact**			
Nature	Negative	Positive	Neutral	
Type	Direct	Indirect	Induced	
Duration	Temporary	Short term	Long term	Permanent
Extent	Local	Regional	National	International
Scale	Not distinguishable	Distinguishable	Evident	Major
Frequency	One-off	Intermittent	Continuous	
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low	Medium	High	
Significance	Not Significant	Minor	Moderate	Major

Recommended Measures

Although the materiality of this impact is assessed as being Not Significant, the following management measures are recommended to be considered in alignment with best practices and Project Standards:

- During construction works, a designated focal point will be stationed on site during work hours to co-ordinate any public interaction (e.g. queries, feedback and complaints).
- Immediate neighbours to the work area will be notified at the start and end of construction activities. Immediate neighbours will be advised on how to use the Grievance Mechanism before construction begins.
- High noise-generating construction works and activities should be limited to the daytime period (7 AM to 10 PM), and work should be avoided non working days and public holidays if possible. Piling to be carried out during daylight hours only. Extension to piling outside of these hours will be risk assessed and communicated to the client and PDO for approval.
- Where practicable, alternatives to noisy diesel and petrol engines and pneumatic units will be used, such as hydraulic or electric-controlled units.
- Throttle settings will be reduced and equipment and plant turned off, when not being used.
- Equipment will be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers will also be checked. Equipment will not be operated until it is

maintained or repaired, where maintenance or repair would address the annoying character of noise identified.

- Minimizing drop height of materials.
- Works associated with transmission line and access road construction often require activities in closer proximity to receptors that are not affected by construction works at permanent facilities. In these circumstances, task-specific noise mitigation and management measures should be implemented (when works are close to receptors) to reduce noise impacts to acceptable levels. As TTE stated, transmission line and access road construction is under PDO Scope. It is considered an associated facility to the project (IFC standard), but mitigation measures must be defined under their specific project ESIAs or in liaison with PDO in case no ESIA is available.
- Implementation of speed limits (50 km/h) for trucks while travelling to and from construction sites (within Buildings and on village roads of poor condition: 30 km/h).
- As part of the Traffic Management Plan, Project's heavy vehicle traffic routing through community areas should be avoided wherever possible.
- Limiting hours of heavy vehicles passing through community areas in case they should cross them.
- If any validated noise complaints are received, the problem source and any potential noise-reducing measures should be identified and evaluated for implementation during the works. If the noise complaint cannot be validated, no further mitigation or management measures are required.
- Vehicles and machinery will be shut-off when not in use on the Project site.

Application of the above measures to manage construction noise will ensure that effects are minimised as far as is reasonably practicable and that the construction process is in compliance with the relevant requirements.

7.5.4.4 OPERATION PHASE

Scoped out as per section 7.6.4.1.

7.5.4.5 DECOMMISSIONING/REPOWERING PHASE

Significance of impacts during Decommissioning or Repowering Phases is considered as per Construction Phase (Section 7.5.4.3). Overall, it is assumed that decommissioning will result in impacts similar in character and significance to those identified for the construction phase but over a shorter period. Impacts related to this phase will be managed through a Decommissioning Plan, or assessed later if repowering is the selected option (the Design Change Management Procedure will be applied). Decommissioning Plan will be prepared in line with legal requirements and international best practice at the time of execution.

Repowering (i.e., replacement of solar panels at the end of the design life, and potentially other project elements) will be potentially undertaken by PDO after the project is handed over to them under the BOOT model, which would extend the operational life of the project. Should PDO elect to re-power the project, it is recommended that EA is re-engaged by PDO to understand EA's requirements in terms of updating the environmental permit to the project and to clarify the mechanism for meeting their requirements with respect to the assessment of environmental impact.

7.5.4.6 ACOUSTICS IMPACT SUMMARY

TABLE 7.22 SUMMARY OF EFFECTS ON NOISE

Impact	**Project Phase**	**Significance (including inherent and design mitigation and management)**	
		Human receptors	
		Pre-mitigation (without embedded mitigation)	**Residual**
Construction / Decommissioning / Repowering activities	Construction/ Decommissioning/ Repowering	Not Significant	Not Significant

7.5.5 CLIMATE CHANGE AND GHG EMISSIONS

This section provides a summary of the Climate Change Risk Assessment (CCRA) key contents and findings. For more detailed information, please refer to the complete report in Appendix D.

ERM has undertaken a Climate Change Risk Assessment (CCRA), as a part of a larger Environmental and Social Impact Assessment (ESIA) – in support of the proposed development of a Solar PV Plant in Oman (hereafter referred to as "The Project").

7.5.5.1 NATIONAL STANDARDS

In compliance with Omani Regulations for the Management of Climate Affairs ('Guidelines for the Preparation of Climate Affairs Chapter in the Environmental Impact Assessment (EIA) Study for the projects') an EIA Rev A was developed by 5OES in June 2024. The EIA was approved by EA in July 2024, and associated permit conditions related to climate change and GHG emissions were issued by EA (October 2024):

- "the company must use appropriate means and techniques to enhance energy efficiency and reduce consumption to the maximum extent possible."

7.5.5.2 INTERNATIONAL STANDARDS

According to the Project international standards and in particular with EP4's 2023 Guidance Note, only a physical CCRA is required for the Project [1]. The physical CCRA is made up of three distinct phases of analysis, the first of which is typically performed at this phase of the project and is included in Appendix D of this report. This Phase includes an assessment of the current and future projected inherent physical climate-related risks which could be material in relation to the construction and operational phases of the Project. Once risks have been quantified, the Client will have the opportunity to implement further management/mitigation measures into the Project's design to manage material risks.

In order to fully align with EP4's 2023 Guidance Note, during later stages of the Project the Project Proponent will be required to 1) financially quantify the risks which have been identified in Phase 1 as potentially material to the Project (Phase 2) and; 2) to show how these risks are being managed/mitigated within a Climate Change Risk Management Plan (CCRMP) (Phase 3). This physical risk assessment utilises projected climate data across three timeframes: baseline (present day), 2030 and 2050 under low (SSP1-2.6) and high (SSP5-8.5) emission scenarios.

Based upon the climate data analysed within this report, a number of key hazards have been identified as posing the most material (inherent) risks in relation to the Project, including:

- Extreme heat;
- Extreme rain flooding (likely to impact some locations within the vicinity of the Project Site as well as its substation);
- Extreme winds and storms; and

[1] The Project is not expected to exceed the threshold of 100,000 tonnes of CO_2 equivalent annually for Scope 1 and 2 emissions. Therefore, a transition CCRA and a GHG alternatives analysis is not required.

- Water stress.

Following the identification of relevant hazards, a longlist of key associated risks has been generated – which are anticipated to have the potential to be material to construction and/or operational phase of the Project. Below is a summary of the most material risks which were identified as a part of this assessment, including the identification of:

- The aspect of the Project each risk is associated with (referred to as 'risk areas'); and
- A summary of ERM's recommended next steps and mitigation measures for each risk.

7.5.5.3 ASSOCIATED RISKS

Figure 7.4 illustrates the risk scores for the most vulnerable location across the Site, which is prone to various physical hazards and has higher risk scores. The hazards such as extreme heat, extreme rainfall flooding, riverine flooding, extreme winds and storms, and water stress emerged as significant concerns, or "Red Flags," for the Project Site, as highlighted in Table 7.23. Extreme heat, tropical storms, and water stress are expected to impact the entire project site. Additionally, as indicated by the hotspot analysis, riverine flooding is unlikely to affect the locations within the Site's periphery. However, footprints of riverine flooding are observed outside the vicinity of the Site, especially on the eastern and southeastern sides. Furthermore, the hotspot analysis for extreme rainfall flooding illustrates inundation within the Site's periphery, especially in the southeastern and northwestern sides, including the locations where the step-up substation and interface yard are situated. Moreover, the regions outside the Site's periphery and the southern side of its sub-station are also prone to extreme rainfall flooding.

FIGURE 7.4 RISK SCORES CORRESPONDING TO SOLAR SITE

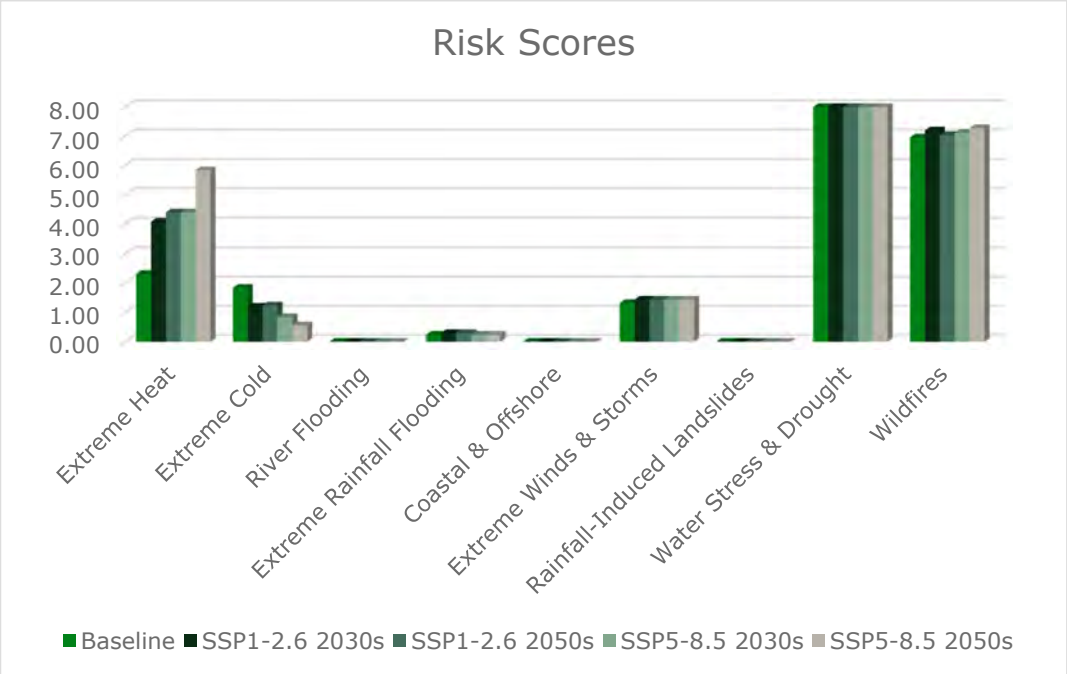


TABLE 7.23 RED FLAGS RESULTS FOR SOLAR SITE

S. No.	Climate-related Risk (Red Flags)		Vulnerable Locations
1.	Extreme Heat		Likely to impact the complete Site
2.	Riverine Flooding		Unlikely to affect the facilities within the Site's periphery; however, inundation footprints are observed outside the Site's vicinity, particularly on the eastern and southeastern sides
3.	Extreme Rain Flooding		Likely to impact the facilities within the Site's periphery, especially the ones located on the southeastern and northwestern sides (including step-up substation and interface yard) as well as the southern side of its sub-station
4.	Extreme Winds & Storms		Likely to impact the complete Site
5.	Water Stress		Likely to impact the complete Site

The key findings of this assessment are:

- In future time horizons, extreme heat is projected to increase moderately to significantly under the considered scenarios (i.e., SSP1-2.6 and SSP5-8.5). The associated risk is categorized as "**Moderate**" during the Baseline but is projected to become "**Very High**" in the future time horizons under the scenarios considered. There is no significant difference in the Baseline and projected risk scores across the Site. Hence, it is important to design the photovoltaic cells and associated facilities across the Site to withstand such extreme temperatures.
    - The maximum of daily maximum temperature during the Baseline is 41.22℃ and is projected to increase by 1.81℃ in the 2050s under the high emission scenario.
    - The warm spell duration index is 47.2 days in the Baseline, and under the considered scenarios, it will likely increase by 2.40 and 2.73 times in the 2030s and 2.70 and 4.45 times in the 2050s.
- The riverine flooding-allied risk is "**Minimal**" in the Baseline and is likely to remain the same in future time frames under both scenarios. The footprints of riverine flooding are observed outside the Site's vicinity, particularly on the eastern and southeastern sides, indicating that the facilities located inside the Site's periphery are unlikely susceptible to riverine flooding. However, considering the fact that the hotspot analysis shows inundation on the eastern and southeastern sides, proper measures need to be taken to reduce the potential impact.

- The risk associated with extreme rainfall flooding is also "**Minimal**" in the Baseline and remains the same in future time frames under considered scenarios, implying "No Change." The footprints of extreme rainfall flooding are observed within the Site's periphery, especially in the southeastern and northwestern sides (including the step-up substation and interface yard), indicating that the Site is vulnerable to extreme rainfall flooding. Additionally, inundation is also observed in the neighbouring regions beyond the Site's periphery as well as on the southern side of its sub-station. Hence proper measures need to be taken to reduce the potential impact.
- The risk associated with extreme winds and storms is "**Low**" in the Baseline and is expected to remain the same in the future time horizons under the considered scenarios. Even though the risk associated with it is "**Low**," wind speed is projected to intensify further (~9.37% increase from the Baseline to 2050 under the SSP5-8.5 scenario). Hence, during the design stage it is recommended to assess the capability of the plant to withstand these impacts and understand the resilience.
    - Under the high emission scenario, the wind associated with tropical storms is likely projected to increase by 4.18 knots in the 2030s and 6.28 knots in the 2050s, compared to the baseline value of 67 knots.
- Water Stress allied risk is "**Very High**" in the Baseline and is likely projected to be the same by the 2030s and 2050s under the considered scenarios. Water stress may not directly impact the physical infrastructure but can affect the operations of Solar Power plants. Therefore, to mitigate adverse impacts, it is recommended to ensure sustainable water management practices.
- The risk of coastal flooding and landslides is considered "**Minimal**" in the Baseline and is likely projected to remain the same by the 2030s and 2050s under both scenarios.
- Wildfire-associated risk is based on the number of days with fire-permitting climatic conditions and is "**Very High**" in the Baseline and is likely projected to remain the same in future time horizons. The historical data conveys no burned area within the vicinity of the asset location, even though the climatic conditions show a High Baseline risk, and the satellite imagery also reveals that the location is not surrounded by dense vegetation. Hence, one can eliminate it as a potential climate risk to the site.

Extreme cold shows a minimal to moderate decrease in risk in the future time horizons under the scenarios considered. Given that the site is in Oman, with an annual minimum temperature of 21.71℃ and a minimum of daily minimum temperature of 10.7℃, one can eliminate it as a potential climate risk to the site.

7.5.5.4 ERM RECOMMENDATIONS

A summary of ERM's recommended next steps and mitigation measures for each risk is shown in Table 7.24.

TABLE 7.24 SUMMARY AND NEXT STEPS

Climate Hazard	Hazard Category	Risk Area	Potential Impact	Implications	Recommended Risk Mitigation Measures
Extreme Heat	Acute / Chronic	Associate and Supporting Facilities	Physical damage to assets	• Extreme heat is expected to pose a high risk to solar power plants, including reduced efficiency, decreased power output, component degradation, increased maintenance costs, and operational risks. • Higher temperatures can reduce the efficiency of photovoltaic cells, thus reducing electrical output. This reduction can impact the ability of the solar power plant to meet electricity demand, which may result in decreased revenue for plant operators. • Extreme heat can cause operational risks for solar power plants, i.e., overheating of electrical components, increased risk of fires, and health and safety risks to site personnel working outdoors. • Extreme heat can cause the expansion/contraction of materials, leading to potential damage to solar panels. As a result, photovoltaic cells degrade more rapidly, which reduces their lifespan and overall durability. • High temperatures can increase the resistance in transmission lines, leading to energy losses during transmission.	• Invest in solar panels made from materials designed to withstand higher temperatures without losing efficiency. • Ensure sufficient airflow beneath panels for cooling. For example, mounting panels slightly above the surface can create a small air gap that helps dissipate heat. • Upgrading transmission infrastructure to withstand extreme weather events, such as using stronger materials to reduce vulnerability. • Implement Dynamic Line Rating (DLR) systems that optimize the use of transmission lines by adjusting power flow based on real-time conditions, such as temperature and wind speed.

Climate Hazard	Hazard Category	Risk Area	Potential Impact	Implications	Recommended Risk Mitigation Measures
				• Can cause the expansion of conductors in transmission lines, which leads to sagging. • During extreme heat events, there may be an increased energy demand for cooling indoor areas for equipment and personnel, which can increase costs.	
		Site Personnel	Impact on workers	• Prolonged exposure to high temperatures can lead to fatigue, heat stress, heat stroke, dehydration, etc., thus affecting the overall health of employees working at the site. • Cause reduction in the physical work capacity/efficiency, leading to lower productivity levels.	• Develop comprehensive heat emergency response plans outlining protocols for addressing heat-related emergencies and providing medical assistance if needed. • Ensure a heat stress management plan included in CCRMP covers outdoor workers and employees. • Implement mandatory rest breaks in shaded or air-conditioned areas to allow workers to cool down. • Provide water and electrolyte drinks at regular intervals to prevent dehydration. • Rotate worker's shifts frequently to limit their exposure to extreme heat. • Conduct heat awareness training programs to educate employees about heat-related risks and the importance of staying hydrated.
Flooding	Acute	Associate and	Physical damage to assets	• Flooding can significantly impact solar power plants, affecting their	• Where feasible, relocate infrastructure at risk of flooding to areas with lower flood risk.

Climate Hazard	Hazard Category	Risk Area	Potential Impact	Implications	Recommended Risk Mitigation Measures
		Supporting Facilities		performance, durability, and financial viability. • Floodwater can damage electrical components such as inverters, transformers, and control systems. Water ingress can cause short circuits and corrosion, leading to malfunctions or complete failure. • Prolonged submersion can physically damage solar panels, as floodwater can carry debris that may scratch or shatter them. • Flood waters can challenge the structural integrity of solar panels, especially the ground-mounted systems, causing misalignment or collapse. • Flooding can hinder repair/maintenance efforts, leading to prolonged downtime and increased costs for restoring normal operations. • Flooding can reduce power generation by reducing the ability of solar panels to capture sunlight efficiently. Further, damage to electrical systems can halt power production. • Floodwaters can carry contaminants that may corrode metal parts. If solar panels or batteries are damaged, hazardous materials could be released into the environment. • The cost of repairing/replacing damaged equipment, including the labor and material costs associated with restoration, can be substantial. • Reduced/halted power generation results in revenue loss.	This option is the most advisable, as it reduces the cost of implementing flood protection measures. • Recommended flood protection measures: ○ Installing electrical components and critical infrastructure above potential flood levels to prevent water damage. ○ Backfilling depressions to the natural ground level to avoid water accumulation. ○ Constructing barriers or levees around the plant to prevent floodwaters from reaching critical areas. ○ Effective drainage systems can help divert floodwaters from the plant, reducing the risk of damage. ○ Implement low-water crossings (Irish type) to prevent site road crossings from flooding. ○ Elevating substations and critical components above-expected flood levels. ○ Installing pumps in low-lying areas to quickly remove accumulated water.

Climate Hazard	Hazard Category	Risk Area	Potential Impact	Implications	Recommended Risk Mitigation Measures
				• Repeated or severe flooding can lead to increased insurance premiums or difficulty obtaining coverage. Insurers may impose higher costs due to the perceived increased risk. • It can cause physical damage to transmission infrastructure, substations, and underground cables.	• Conduct routine inspections and maintenance to identify vulnerabilities and ensure that protective measures are functioning properly. • Obtain comprehensive insurance coverage that also includes flood damage to mitigate financial risks.
		Site Personnel	Impact on workers	• Floodwaters can lead to short circuits and other electrical hazards. • Floodwaters can make it difficult for workers to access the site, disrupting maintenance and operational activities. • Floodwaters can spread contaminants, thus affecting the local environment and worker's health.	• Develop emergency response plans, outlining specific actions to be taken during flood events. • Train staff on emergency procedures and conduct regular drills to ensure readiness. • Implement effective drainage systems to redirect water from the Site.
Water Stress	Chronic	Associate and Supporting Facilities	Physical damage to assets	• Water scarcity may not directly impact the physical infrastructure but can affect the operations of Solar Power plants. • Solar panels require regular cleaning to maintain optimal performance. In regions with water scarcity, access to enough water for cleaning can be limited or expensive, leading to a decrease in operational efficiency and energy output due to the build-up of dirt and dust obstructing sunlight from reaching the photovoltaic cells. • The cost of water may also go up. The exposure could be rated low depending on how the panels are cleaned, e.g., AI	• If water is needed for operations, consider using non-potable sources like treated wastewater or greywater to reduce the demand for local freshwater supplies. • Deploy robotic cleaning systems that can operate with minimal water or use no water at all. • Identify alternate water sources to ensure uninterrupted water supply during periods of water stress. • Explore opportunities for rainwater harvesting at the site

Climate Hazard	Hazard Category	Risk Area	Potential Impact	Implications	Recommended Risk Mitigation Measures
				robots use comparatively less water than manual cleaning. • Water scarcity may also trigger regulatory considerations for the developers/operators of solar power plants. Government authorities may impose restrictions on water usage and necessitate the implementation of water-saving technologies.	and within a wider watershed area. • Comply with local and national water use regulations to avoid legal issues and ensure sustainable water practices. • Develop and implement water conservation policies and practices within the solar power plant operations. • Implement systems to regularly monitor water usage to identify leaks, wastage, or inefficiencies.
		Site Personnel	Impact on workers	• There may be a health and safety risk for site personnel if there is not adequate drinking water supply. • Water stress can exacerbate the risk of heat-related illnesses such as heat exhaustion and heat stroke in hot climates. • Insufficient water for sanitation can lead to poor hygiene, thus increasing the risk of infections and illnesses.	• Implement systems to recycle/reuse water for cleaning and cooling purposes. • Ensure workers have an ample supply of drinking water and encourage regular hydration breaks. • Implement programs to educate workers and local communities on water conservation practices and the importance of sustainable water management.
Cyclones (Extreme winds and storms)	Acute	Associate and Supporting Facilities	Physical damage to assets	• Cyclones can pose significant challenges to solar power plant operations and maintenance. Hence, proactive measures are necessary to improve resilience, reduce risks, and ensure the long-term sustainability of solar energy infrastructure in cyclone-prone regions.	• Mounting structures and support systems of solar panels should be designed to withstand high wind and debris impact, i.e., using materials and engineering standards that adhere to local building codes and regulations.

Climate Hazard	Hazard Category	Risk Area	Potential Impact	Implications	Recommended Risk Mitigation Measures
				• Strong winds allied with cyclones can cause extensive damage to solar panels (i.e., wrecked glasses and bent frames) that will affect the integrity and functionality of the panels. • Can interrupt the normal operations of solar power plants by causing power outages, damage to electrical components, and disruptions in grid connectivity, leading to decreased energy production and revenue loss. • Can cause structural damage to mounting systems, support structures, and other components. • Cyclones and high winds can cause direct physical damage to transmission lines, i.e., breaking of cables and damaging substations. • Flying debris can strike transmission lines, causing breaks or damaging insulation. • The operators may incur substantial costs associated with repairing/replacing of damaged equipment to restore operations to normalcy. • Cyclones can cause prolonged downtime of solar power plants, leading to a loss in productivity and revenue generation during the period. • Insurance premiums may increase in cyclone-prone regions due to the higher risk associated with operating solar installations.	• Develop and implement cyclone-specific emergency preparedness and response plans and establish protocols for securing equipment, evacuating personnel, and shutting down operations safely in advance. • Installing power backups, i.e., battery storage and/or diesel generators, to maintain key operations during the time of power outages caused by cyclones. • Stay informed about evolving weather conditions and take proactive measures regarding the potential impacts of Cyclones on solar power plant operations. • Obtain appropriate insurance for cyclone-related risks and losses and work closely with insurers to understand policy terms and conditions, coverage limits, and claim procedures.
		Site Personnel	Impact on workers	• High winds and flying debris can cause physical injuries to workers.	• Provide training to staff members on cyclone safety,

Climate Hazard	Hazard Category	Risk Area	Potential Impact	Implications	Recommended Risk Mitigation Measures
				• Flooded or blocked roads can prevent workers from reaching the site or evacuating if necessary. • Floodwaters can carry contaminants, potentially impacting both the environment and worker health.	emergency procedures, and first aid. • Ensure that there are robust, cyclone-resistant shelters on-site where workers can take shelter during a storm. • Use cyclone-resistant designs for buildings and critical infrastructure to withstand high winds and flooding. • Run awareness programs to inform workers about the risks of cyclones and the importance of following safety protocols.

7.5.6 LANDSCAPE & VISUAL

7.5.6.1 SCOPE OF THE ASSESSMENT

This section is a limited assessment of the following Project activities' potential impacts on landscape and visual:

Project phase	Activity with potential impact
Construction	• Site preparation: including clearing, grading, and levelling to create flat land • Construction of temporary construction compound, lay-down area and guardhouse • Construction of internal roads and drainage system (as required), inter-linking the external site access road, panels' locations and step-up substation • Installation of security fencing and security system around the Project site • Vehicle movement, including road transportation of project components from Sohar Port to the site • Installation of inverters, transformers, PV panels and their foundations, step-up substation, meteorological stations, electrical infrastructure and signal cables • Removal of construction equipment and temporary facilities and reinstatement
Operation	• It is assumed that operation will result no impact on the landscape
Decommissioning	• Removal, recycling/disposal of surface structures • Reinstatement and restoration of the affected sites
Repowering	Similar to Construction and Decommissioning phases.

Visualization and photomontage is presented in Appendix I.

7.5.6.2 SENSITIVITY OF THE RECEPTOR LANDSCAPE

Landscape sensitivity can be assessed by the ability of a particular landscape character to absorb aesthetic alterations.

When determining the significance of landscape effects, the following should also be considered:

- The loss of mature or diverse landscape elements or features is likely to be more significant than the loss of new or uniform elements;
- Effects on character areas, which are representative, may be more important than the loss of areas in poor condition or degraded areas. The test of significance is not directly related to planning policy;
- The loss of landscape elements, features or characteristics will be given greater weight if they are identified as being of high value. Therefore, effects on nationally designated areas are likely to be more significant than effects on areas of local value; and
- The sensitivity of the landscape is dependent on both the attributes of the landscape and the characteristics of the Project. Landscapes with a high sensitivity to the type of change proposed are more likely to be seriously affected than those with a lower sensitivity.

As indicated in Section 6.1.8.3 the Project site is located in PDO's Block 6 and the land use of the surrounding areas is therefore associated with PDO's oil and gas activities and related land uses and infrastructure (oil rigs, mud pits, pipelines etc.). The footprint of the Project site is undeveloped and there are no permanent settlements in the landscape AOI.

The sensitivity of the landscape resource is expected to be Low, as character type identified lacks any recognizable features of local or national value and has few distinctive or unique characteristics to distinguish it from surrounding areas.

7.5.6.3 SENSITIVITY OF THE RECEPTOR VISUAL

The sensitivity of visual receptors is an important issue in the assessment of the significance of an impact and is based on the type of receptor, as well as the special nature of the view.

As indicated in the above paragraph there are no permanent settlements in the AOI. Oil field workers are accommodated in the contractor's camp at Saih Niyahdah, which is 5 km from the solar farm site to the SW. This camp is the only receptor in the AOI.

The value of the view from this location is Low.

7.5.6.4 CONSTRUCTION LANDSCAPE

The landscape impact assessment describes the nature and scale of changes to individual landscape elements and characteristics, and the subsequent effect on the landscape as a resource. To determine the significance of landscape effects it is necessary to consider the sensitivity of the landscape against the magnitude of landscape effects.

Landscape resources have been assessed in terms of their sensitivity, combining judgements on their susceptibility to the specific change proposed and the value attached to the resource. Susceptibility is the degree to which a particular landscape type or area can accommodate change arising from the Project, without detrimental effects on its character, and will vary with the:

- Existing land use;
- Pattern and scale of the landscape;
- Sense of enclosure and tranquility;
- Condition of the landscape; and
- Scope of mitigation, which would be in character with the existing landscape.

The Magnitude is expected to be Low.

The impact of the Project on the landscape character is considered Not significant.

TABLE 7.25 IMPACT ASSESSMENT SUMMARY: CONSTRUCTION LANDSCAPE

Impact	**Construction Landscape Impact**			
Nature	Negative	Positive	Neutral	
Type	Direct	Indirect	Induced	
Duration	Temporary	Short term	Long term	Permanent
Extent	Local	Regional	National	International

Impact	**Construction Landscape Impact**				
Scale	Not distinguishable	Distinguishable	Evident	Major	
Frequency	One-off	Intermittent	Continuous		
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low	Medium	High		
Significance	Not Significant	Minor	Moderate	Major	

Recommended Measures

Although the materiality of this impact is assessed as being Not Significant, the following management measures are recommended to be considered in alignment with best practices and Project Standards :

- Areas of surface disturbance should be minimized as much as possible and be within the limits established by the EPC;
- Where possible locate laydown areas and construction camps in areas that are already disturbed or cleared of vegetation;
- Maintenance of construction site – good housekeeping on site to avoid litter and minimize waste. Excess mud or debris on construction vehicles leaving the site will be removed.
- Existing tracks/roads should be used for access where possible;
- Technical building should have a non-reflective finish and the color should be appropriate in order to merge itself as much as possible within the landscape.
- Minimize night lighting in order to guarantee the minimum safety level. Temporary and permanent security lighting will be installed in a manner to avoid excessive light spillage offsite and to alert on intruders.
- Boundary fencing will be designed, according following ROP requirements. It will be visually unobtrusive (chain link with appropriately coloured shade cloth) with appropriate coloured shade cloth to act as a barrier for wind-blown dust and sand entering the site at ground level.
- Mini-buses (or other bulk transport vehicles) will be encouraged to limit individual vehicles on site.

7.5.6.5 CONSTRUCTION VISUAL

The visual impact is a product of the magnitude of change to the existing baseline conditions, the landscape context, and the sensitivities of visual receptors.

Construction of the solar farm is likely to generate visual impacts associated with panel installation and vehicle movement. The Magnitude is expected to be Negligible.

The impact of the Project on the visual is considered Not significant.

Recommended Measures

Although the materiality of this impact is assessed as being Not Significant, the following management measures are recommended to be considered in alignment with best practices and Project Standards The objective of the management measures is to minimize visual scarring of the landscape and to enhance absorption of the development into the surrounding environment.

Specific recommended measures during operation as best practices include:

- No debris or waste materials will be left at the work sites, good housekeeping on site to avoid litter and minimize waste.
- Technical building should have a non-reflective finish and the color should be appropriate in order to merge itself as much as possible within the landscape.
- Night lighting of sites should be minimized within requirements of safety and efficiency.
- Ongoing rehabilitation of cleared areas to minimize visual scarring and maintenance clearing will be kept to the absolute minimum and should not extend beyond the work area.

7.5.6.6 OPERATION LANDSCAPE

It is assumed that operational will result no impact on the landscape.

7.5.6.7 OPERATION VISUAL

Operation phase will see the introduction of large scale features that would occupy a proportion of the view.

The viewshed analysis shows that the proposed PV solar has the potential to be visible near the Project area, however there aren't permanent settlements in the view shed of the Project, and the landscape around the Project site is a industrialized nature.

Based on the above information, the viewpoint selected is in the contractors' camps at Saih Nihayadah, located in the car park outside the camp so provides an unobstructed view of the project area.

Due the distance the magnitude is expected to be Negligible.

The impact significance, receptor sensitivity, and impact magnitude are summarized in the table below.

The result of photosimulation can be viewed in Appendix I.

TABLE 7.26 IMPACT ASSESSMENT SUMMARY: OPERATIONAL VISUAL

Impact	**Operational Visual Impact**			
Nature	Negative	Positive		Neutral
Type	Direct	Indirect		Induced
Duration	Temporary	Short term	Long term	Permanent
Extent	Local	Regional	National	International

Impact	**Operational Visual Impact**							
Scale	Not distinguishable		Distinguishable		Evident		Major	
Frequency	One-off		Intermittent			Continuous		
Magnitude	Positive	Negligible	Small		Medium		Large	
Receptor sensitivity	Low		Medium			High		
Significance	Not Significant		Minor		Moderate		Major	

7.5.6.8 DECOMMISSIONING LANDSCAPE

Project decommissioning will take place upon ceasing of operation of the solar farm and will likely generate impacts on landscape associated with land restoration works, similar to activities developed during the construction phase. Overall, it is assumed that decommissioning will result in impacts similar in character and significance to those identified for the construction phase, but likely of shorter duration and with a lower volume of works.

The impact of the Project on the landscape character is considered Not significant and will be managed through the Decommissioning Management Plan.

7.5.6.9 DECOMMISSIONING VISUAL

Project decommissioning will take place upon ceasing of operation of the solar farm and will likely generate impacts on visual associated with panel and facilities removal, similar to activities developed during the construction phase.

The impact of the Project on the landscape character is considered Not significant and will be managed through the Decommissioning Management Plan.

7.5.6.10 REPOWERING

Repowering (i.e., replacement of solar panels at the end of the design life, and potentially other project elements) will be potentially undertaken by PDO after the project is handed over to them under the BOOT model, which would extend the operational life of the project. Should PDO elect to re-power the project, it is recommended that EA is re-engaged by PDO to understand EA's requirements in terms of updating the environmental permit to the project and to clarify the mechanism for meeting their requirements with respect to the assessment of environmental impact.

Repowering would take place upon ceasing of operation of the solar farm and will likely generate impacts on landscape and visual associated with repowering works, similar to activities developed during the construction phase. Impacts from repowering phase will be assessed later if repowering is the selected option (the Design Change Management Procedure will be applied).

7.5.6.11 LANDSCAPE AND VISUAL IMPACTS SUMMARY

TABLE 7.27 SUMMARY OF EFFECTS ON LANDSCAPE AND VISUAL

Impact	Project Phase	Landscape resource / Visual Receptor 1	
		Pre-mitigation	**Residual**
Aesthetic alterations	Landscape Construction	Not Significant	Not Significant
Land restoration	Landscape decommissioning	Not Significant	Not Significant
Solar farm visibility	Visual Construction	Not Significant	Not Significant
Solar farm visibility	Visual Operation	Not Significant	Not Significant
Solar farm removal	Visual decommissioning/ repowering	Not Significant	Not Significant

7.5.7 TERRESTRIAL HABITATS, FLORA AND FAUNA

7.5.7.1 SCOPE OF THE ASSESSMENT

This section assesses the following Project activities with the potential to impact biodiversity resources:

Project phase	Activity with potential impact
Construction	Clearance for the solar farm site, access tracks, cable array, transformer and substation, site offices and laydown areas.
	Presence of construction workforce, activity and noise
	Vehicle movements and construction activity
Operation	Presence of operation workforce, activity and noise
Repowering and/or Decommissioning	Re-powering and/or Deconstruction activities and reinstatement of site

The ecological impacts from solar farms have recently been reviewed (Jenkins et al., 2017 with a focus on impacts to birds, Bennun et al., 2021), and these reviews have been used as the basis for the impact assessment, specifically to identify evidence-based sources of ecological impact and risk. These sources of ecological impact and risk have been assessed for the North Oman Solar project in the sections below.

Habitat loss and barrier effects: PV facilities typically involve the complete removal of vegetation from the footprint of the developed area, which has the potential to destroy or fragment habitat for mammals, reptiles and birds, which is particularly important in relation to species with restricted ranges and very specific habitat requirements (Lovich & Ennen, 2011; Jenkins et al., 2017). The assessment assumes that no ecologically functional habitat will remain or recover in the area in which solar panels and the associated cable network, internal roads, and buildings will be installed (206 ha), and that unused areas within the plot will remain undisturbed. It is further assumed that the perimeter fencing, to be installed along the plot boundary, will act as a barrier for the movement of mammals and some reptiles, which may otherwise forage/scavenge in or transit through development area.

Collision risk with solar panels: Collision mortality impacts of birds with solar panels may also be an important factor arising from the effect solar panels have on reflected polarized light (Jenkins et al., 2017). General ecological risks arising from alterations in the polarized light field caused by reflections from manmade materials was first hypothesized by Horváth et al. (2007), who stated that solar panels are a possible source of polarized light pollution, notably on insects, herptiles and potentially birds, and advocated for further research into its potential ecological consequences. A review of the ecological effects of solar farms (PV and CSP) in the deserts of southwestern USA by Lovich & Ennen (2011), which focused on the impacts to reptiles, concluded that the ecological effects of polarized light from solar farms was speculative because of the lack of scientific studies. The idea that solar farms may appear to birds as a water body, known as the 'Lake Effect Hypothesis', was first published in 2014 by Scientific American (Upton, 2014). Since then, one of the most rigorous studies to investigate the lake effect hypothesis (Riser-Espinoza et al., 2021), concluded that birds perceiving solar panels as a waterbody is likely a nuanced process that is likely to be context specific i.e. more

likely to occur in areas surrounded by water bodies such as wetlands, a view that is echoed by Bennun et al (2021), who state that 'to date, there is little evidence to support the existence of the suggested 'lake effect'. Further scientific investigation into the lake effect hypothesis is ongoing (USGS, 2023). Guided by expert opinion and current practice in South Africa (Owen, pers. Comm., 2024) this assessment considers the lake effect hypothesis as 'unlikely', in accordance with the definitions given in Table 7.9. However, bird collisions at solar farms have been documented, although the cause, including but not limited to the lake effect hypothesis, is not well understood.

In reviewing bird fatality monitoring at solar farms in western USA, Bennun et al (2021) found that the average annual fatality was 2.49 birds per MW per year, but went on to state that the collision risk with solar panels is likely low compared to that posed by transmission lines based on evidence from Harrison (2016). There is no proven risk for bats from PV solar farms (Bennun et al., 2021).

Bird collision and electrocution risk associated overhead transmission lines. Overhead lines connecting the solar farm to the off-taker's sub-station is within scope of this impact assessment as this is an associated facility. Bennun et al. (2021) indicate that the risk of electrocution is greatest on low and medium voltage lines, and that electrocutions are rarely significant on high voltage transmission lines. All medium voltage power lines within the solar farm and to the step-up substation will be buried, which eliminates collision and electrocution risk within the site. Only bird collision risk with 132 kV OHL from the step-up substation to the off-take sub-station at Saih Nihaydah (a distance of 5 km) is considered in the assessment.

Pollution. This impact relates to noise and vibration, dust, light and during construction and maintenance activities. Bennun et al. (2021) note that examples specific to solar farms are limited, but such impacts are common for other types of infrastructure projects with similar activities.

Attraction of novel and invasive species. Invasive plants, most notably *Prosopis juliflora*, occurs in the project area and are easily spread inadvertently. Bennun et al., (2021) consider pathways that may transport seeds of alien plant species, in particularly those that are already present in the AOI. Solar farms may also attract novel species to an area by the artificial provision of otherwise scarce resources, such as shade, nesting sites and perches (Jenkins et al., 2017). Food waste management and pest control have been assumed to be embedded in the project activities.

Associated ecosystem service impacts. Bennun et al. (2021) refer to the loss of provisioning ecosystem services but also other forms of ecosystem services including loss of cultural value and a sense of place by local communities. The scope of the ecology impact assessment is limited to the direct loss of grazing.

Potential impacts arising from solar facilities listed by Bennun et al. (2021) that are not applicable to the North Solar Farm include: i) habitat degradation due to changes in hydrology and water availability and quality, ii) wildlife mortality due to attraction to evaporation ponds, iii)

7.5.7.2 SENSITIVITY OF THE RECEPTORS

The majority of plant and animal species recorded at Project site and in the AOI are all common and widespread. No plant species of conservation concern or on the Oman Plant Red

List were recorded during baseline surveys, and all are considered to be of low sensitivity/value.

All habitats occurring at project site and in the 5 km AOI established for terrestrial ecology are widespread in northern Oman and none are considered to be sensitive from a conservation perspective. Areas on site hosting a more diverse plant community and greater vegetation cover are drainage channels, but these areas also contain common, widely distributed plant species, and cover is low (estimated to be less than 5%). Accordingly, all habitats on site are defined as being of low sensitivity from a biodiversity and ecological value perspective.

Apart from the Arabian Red Fox, which is named in Appendix II of RD 114/2001, no mammal species of conservation concern were recorded in the Project AOI. On site, signs and tracks of Arabian Red Foxes were observed, but no direct sightings of this species were made indicating that foxes probably forage on site but it is unlikely that any active fox dens occur within the project boundary. Arabian Red Foxes are distributed widely across Oman and are one of the most commonly observed mammalian wildlife species, and are therefore considered to have low sensitivity.

The bird community observed in the project AOI consists of species that are considered to be of least concern from a conservation perspective, and have a widespread distribution in Arabia. No species of conservation concern, i.e. priority species, have been observed on site or in the AOI to date. The abundance and diversity of bird species in the AOI is low, and therefore the bird community in general is categorized as having low sensitivity. Waterbirds that may migrate through the area during the autumn and spring migration season, are generally of least concern, although some species of conservation concern such as flamingos and storks may transit the area attracted by artificial surface water bodies within the AOI, and are therefore considered sensitive, particularly to collision and electrocution risk associated with overhead power lines.

One pair of Spotted Sandgrouse, *Pterocles senegallus,* were observed on site in May 2024 displaying typical breeding behaviour. Their nest was not directly observed, but it is reasonable to assume that this pair were breeding on site. Spotted sandgrouse are listed by IUCN as being of least concern (LC) globally, and are also listed in the conservation assessment of Arabian Breeding Birds (Symes et al 2015) as being of least concern. In this impact assessment their sensitivity, and that of ground nesting birds in the AOI generally, is therefore considered to be low.

The direction of the bird migration in Autumn is in a southerly direction, and during the Spring migration season it is generally northward. Due to the central deserts' relatively flat and homogenous character, the migration is not focused along well-defined routes or choke points, so migrating birds are not channelled through the Projects AOI. Migrating water birds on the other hand will be attracted to surface water bodies (e.g. groundwater storage reservoirs and reverse osmosis evaporation ponds) in the project AOI.

The project site is occasionally grazed by camels as observed during the camera trapping survey, with camels (groups of 2 – 9, average 4.3) recorded on 10 days of the 49 day monitoring period (20% of the time). Grazing is the only ecosystem service provided by the habitats on site and is therefore relevant in terms of IFC Performance Standard 6. Of the three camera trapping stations, grazing activity was most commonly observed on site in an area of relatively high vegetation cover in a former borrow pit. Although the numbers of camels observed on site is relatively low and their frequency of occurrence on site is around 20%,

since the livelihoods of people engaged in pastoralism/raising livestock depend on access to and use of grazing land with relatively few opportunities to adapt to reduced access to resources, grazing is considered to be of medium sensitivity.

7.5.7.3 EMBEDDED MITIGATION

The following measures have been embedded in the Project design and approach, in relation to habitats, flora and fauna, and ecosystem services:

- Site selection has been conducted systematically by PDO (as described during the PDO engagement meeting on 23 July 2024) to avoid social and environmental sensitivities within a feasible distance from the off-taker substation.
- The site (including temporary facilities) will be fenced with chain-linked fencing and clad with shade netting which will exclude most terrestrial fauna (i.e. species larger than 5 cm) and reduce the risk of bird collisions with solar panels.
- Levelling the site will be achieved with a neutral cut and fill balance, meaning that no new borrow pits outside the project boundary will be required for bulk fill. However, engineered fill will be required for the construction of the access and internal roads.
- The one tree (*Prosopis cineraria*, i.e. ghaf tree) on site has been incorporated into the project design and will remain *in situ*.
- Lighting will be kept to a minimum and will be limited to working areas only.
- Vehicle movements will be controlled i) maximum speed of 60 kmh on unpaved roads, and ii) very limited vehicle movements after dark. Vehicle movements after dark will be restricted to security related vehicle movements and emergency situations.
- Waste management procedures will follow best practice.
- Best practice will be implemented with respect to environmental and social management.

Further mitigation measures to avoid, reduce or offset predicted impacts are set out in the following sections in relation to specific impacts.

7.5.7.4 CONSTRUCTION – SITE CLEARANCE RESULTING IN LOSS AND FRAGMENTATION OF HABITATS

During construction, vegetation will be cleared in the area to be installed with solar panels, cables, site offices, the step-up substation, and the internal road network that includes a buffer of 50 m around these areas, within the project boundary and the footprint of the access road connecting the network of paved roads to the site. Habitat losses have been calculated using the ground truthed habitat mapping, as set out in Table 7.28. Area calculations include i) the development plot, ii) 20 m buffer around the inside and outside of the plot boundary to allow for working area required for the installation of the perimeter fencing and habitat degradation in the buffer zone arising from excessive dust during earthworks, iii) access road. The area of land expected to be required and disturbed during construction totals 206.84 ha.

Of this total, the buffer zones around work areas will be temporarily disturbed during construction by vehicle movements and dust will be 65 ha, with an additional 1 ha required (allowing for a buffer) outside the plot boundary to be used as a lay down area, making a total of 66 ha of temporary disturbance.

TABLE 7.28 HABITAT TYPES AND PLANTS WITHIN THE PROJECT FOOTPRINT AND 50 M BUFFER ACCORDING TO HABITAT MAPPING

Habitat Code	Habitat types	Permanent Area Lost During Construction and Operation (ha)	Temporary Area Lost During Construction (ha)
5102	Gravel plains with dwarf shrub vegetation	79	24
5130	Barren Gravel plains with sparse vegetation	75	22
5200	Gravel hills with rocky outcrops	39	19
6320	Drainage channels	7	-
9600	Disturbed ground	9	1
Total		209	66

The habitat loss of the proposed Project footprint is estimated at 209 ha of long-term loss and 66 ha of temporary loss from the temporary site facilities and laydown area. Barren gravel plains and gravel hills with rocky outcrops are all sparsely or very sparsely vegetated (0.1 – 1% cover), with gravel plains with dwarf shrub cover and drainage channels having an estimated vegetation cover of 1-5%, all comprising plant species that are widespread. All habitat types are considered to have low sensitivity.

Construction of Project infrastructure will result in the loss of natural habitat for at least the duration of the Project. The installation of construction office facilities and laydown areas will result in the temporary removal of habitat, which will recover over the lifetime of the project, if the temporary site facilities are reinstated. The overall level of habitat loss is considered to be relatively small in relation to the relatively extensive areas of similar undisturbed desert habitat in wider area, particularly to the east of the site. Areas, particularly to the southwest of the development site around the Saih Nihaydah gas field, are significantly modified or disturbed by oil and gas exploration and production activities.

Habitat loss includes the loss of plants that contribute to ecological value of the habitat. These habitats also provide nesting opportunities for ground nesting birds such as the Spotted sandgrouse, *Pterocles senegallus.* One pair of this species was observed exhibiting breeding behaviour on site in May 2024. It is further expected that the area lies within the home range of Arabian Red Foxes that live in the project AOI. The number of foxes that are likely to forage periodically within the development site is low, perhaps 2-4 individual animals. The value of habitats on site to foxes is expected to be low, but the fencing will fragment their range, and animals that would otherwise transit across the site to access other parts of their home range will now need to deviate around the area. The energetic cost of additional travel time arising from the project is low, considering the range (approximately 50 sq km in desert areas; McDonald, 1987). Other species, such as reptiles and insects, occurring within the project area are widespread in Oman and are not of conservation concern.

Fencing of the project area that retains undisturbed habitat is expected to provide some benefit in terms of habitat condition due to its effect on grazing pressure. The exclusion of

camels from the site may allow the floral community to slowly recover from chronic overgrazing that is widespread in Oman's desert rangelands. The rate of recovery will depend on factors including the frequency of rain fall and the status of the seedbank in undisturbed areas, but is expected to take many years. The development area (302 ha) is predicted to include around 27 ha of undisturbed habitat within it, which is around 9% of the area contained by the plot boundary.

Impact Significance

Impacts on habitats will be minimised as far as practicable, with a residual loss of 206.24 ha of widespread desert habitat. The proposed mitigation measures are largely intended to avoid impacts beyond what is expected in the assessment above, and to ensure that the construction activities are executed in a way that minimizes impact. Key aspects in the determination of significance are the low sensitivity of the habitats and their ecological value to bird and mammal species. The proposed development footprint will result in a minor negative impact to the ecological functioning and integrity of the habitats present because of loss and fragmentation, but it is considered unlikely that these impacts will affect the long-term persistence or viability of species occuring on the site and in the project's AOI.

TABLE 7.29 IMPACT ASSESSMENT SUMMARY: VEGETATION CLEARANCE RESULTING IN LOSS OF HABITATS AND SPECIES

Impact	Habitat loss				
Nature	**Negative**	Positive	Neutral		
	Habitat loss will have a negative effect on the plants and animals that rely upon it.				
Type	**Direct**	Indirect	Induced		
	Habitat loss will occur directly as a result of vegetation clearance and disturbance caused by associated construction activity (e.g., vehicle movements and dust).				
Duration	**Temporary**	Short term	**Long term**	Permanent	
	Loss will be long term for the project area and access road, and temporary for the site construction office, laydown areas and buffer zones around work areas that will be impacted by excessive settlement of dust.				
Extent	**Local**	Regional	National	International	
	Impacts will only occur within Project site and a 50 m buffer zone around the project boundary.				
Scale	Vegetation clearance will occur across the whole development area resulting in approximately 206 ha of habitat that will be permanently cleared and a further 0,6 ha that will be temporarily disturbed during the construction phase.				
Frequency	One-off	Intermittent	**Continuous**		
	Impacts will occur during construction – habitat loss will last for the duration of the Project, apart from temporary construction areas which will be restored (66 ha)				
Magnitude	Positive	Negligible	**Small**	Medium	Large
	Due to low plant cover present and relatively small size of the affected area (375 ha) the magnitude will be small.				
Receptor sensitivity	**Low**	Medium	High		
	The sensitivity/value of terrestrial habitats within the Project boundary is considered low.				
Significance	Not Significant	**Minor**	Moderate	Major	
	In the absence of mitigation measures, the impacts on receptors will be Minor since the habitats have low sensitivity/value				

Mitigation/Management Measures

Mitigation measures to reduce impacts to ecology and best practice approaches will be incorporated into the construction of the Project. Unless stated otherwise, these measures will be captured in the ESMMP:

- Existing roads will be used as far as possible to reduce habitat loss. Access to work areas will be restricted to being from within the project area via defined routes (i.e. the planned internal road network), and no off-road driving or use of construction equipment outside the project boundary is permitted except when necessary to install the perimeter fencing;
- Erection of the perimeter fence should be scheduled early in the work program to exclude wildlife from entering the site during the construction period and to control access to the site by work traffic, subject to procurement plan and availability of supply;
- Construction of the access road and the internal road network should also be scheduled early in the workplan to minimise disturbance.
- Habitat loss will be limited to the minimum needed for safe and efficient implementation of the works, not exceeding 50 m outside the project boundary;
- Areas within the project area (krookie) that are not to be developed are to be highlighted on a map and marked as being out of bounds (i.e. no access permitted) and included in the HSE induction briefing to all contractor personnel to prevent inadvertent disturbance of these areas.
- Dust suppression methods will be used during earthworks to limit the impact of dust on vegetation in surrounding areas to limit any excessive dust accumulation to within 50 m of the project boundary, (as per section 7.5.3, measure to be included in the CEMMP);
- Sourcing fill material required for the construction of the access road and internal roads will be from existing, operational quarries or borrow pits. No new borrow pits will be opened to source fill material for the project. If new borrow pits are opened to provide material for this project, their area will be added to the habitat loss calculations on which this assessment is based (measure to be included in the CEMMP);
-
- The requirement for No Net Loss is subject to further study and investigation to be conducted post-ESIA to demonstrate feasibility (e.g., land ownership issues, feedback from the local community of camel grazers, PDO etc.). If Not Net Loss is feasible, design detail will be provided to compensate for the loss of habitats on site, in compliance with IFC PS6; this will be included in the ESMMP.
- If any planting is required for landscaping of the project site this will use endemic plants that are suited to local conditions, and advice should be sought from the Oman Botanic Gardens when selecting landscaping species. Endemic plants consume less irrigation water (if any) and will contribute to the ecological function of the project area. Suitable endemic tree species for landscaping includes, but is not limited to, *Vachellia* species, *Prosopis cineraria*, *Ziziphus spina-christi*, *Salvadoria persica*, *Moringa peregrina*, and *Tamarix arabica.*
- Ground clearance should avoid the breeding season of ground nesting birds (February – September), i.e. if feasible, earthworks should be scheduled to commence between October – January. Deterring nesting on site before the start of the breeding season is the preferred option, as this will avoid impact to nesting birds by displacing them to surrounding areas. However, should it be unavoidable to schedule the start of ground clearance activity during the nesting period, a nesting bird survey should be conducted to identify any pre-breeding bird behaviour, and if pre-breeding behaviour is identified it is recommended that sufficient disturbance by human activity on site (e.g., installation of passive bird deterrents such as scarecrows or other visual deterrents, and active

disturbance such as early construction works (e.g. marking out or driving over the site several times a day in a 4x4 vehicle).

- The Construction Environmental Management and Monitoring Plan (CEMMP) will detail best practice measures including those listed above and others to be implemented, to reduce the risk of secondary impacts to habitats and fauna species including to control dust etc. The CEMMP should recognise the importance of areas within the plot that are will be set aside (i.e., areas not developed or disturbed by construction activity).

Residual Impact Significance

With the application of the above mitigation measures the residual impact is considered to be Not Significant.

7.5.7.5 CONSTRUCTION AND OPERATION– LOSS OF ECOSYSTEM SERVICES (GRAZING)

It is recommended that the Project site is fenced early in the work schedule to constrain construction activities and to exclude wildlife and livestock and avoid their exposure to risks associated with construction activity.

There is a possibility that the Project use (including fencing/access control) of the land affects seasonal grazing activities/herding practices by preventing traditional users from accessing and utilizing the land as they have in the past. Residents of Abu Thaylah, the only permanent settlement in the Social AOI, raise livestock (primarily camels, but also goats) as their primary livelihood, so this activity has both high socio-economic and cultural importance to the local Omani population. This was borne out during engagement with stakeholders in July 2024 indicated that grievances arise when camels are impacted by industrial activities and traffic using paved (Road 31) and unpaved roads in the area. Sensitivity of the ultimate receptor (owners of livestock) is considered to be medium with respect to direct impacts (losses) to their livestock. This is because they are likely accustomed to accessing open rangeland elsewhere and would be able to adapt to the restriction on access to the land taken by the Project.. On the other hand, access to grazing areas for livestock is an indirect impact, and the potential to adapt or accommodate loss of access to grazing at the Project site is greater, so the sensitivity is assessed to be medium with respect to loss of grazing.

The site offers limited grazing value for camels since vegetation cover is generally very sparce (0.1 – 1 % cover) across the majority of the site. The exceptions to this are the drainage channels (with estimated plant cover up to 5%) and some areas where disturbed ground caused by past aggregate extraction (borrow pits) has led to favorable conditions for plant cover to increase to an estimated maximum of 30% because of altered soil conditions and increased water retention. Within the development area, these areas can be seen as having high vegetation cover (x2 areas) medium density vegetation (x9 areas) in Figure 6.41 in the terrestrial ecology baseline chapter. Such areas are small, generally around 0.5 ha, but are nevertheless visited regularly (20% of the time) by small groups 2-9 of camels for a period of a few hours on each occasion. The impact assessment for the loss of grazing shows that the scale of the loss is small, but due to the sensitivity surrounding the issue measures are required to ensure ongoing good will and favorable perception of the project by the local community.

Other than grazing, no other ecosystem service provided by habitats on site has been identified (socio-economic impacts related to ecosystem service losses are discussed in section 7.7).

Impact Significance

Impacts arising from the loss of grazing are assessed as being Minor.

TABLE 7.30 IMPACT ASSESSMENT SUMMARY: LOSS OF ECOSYSTEM SERVICES (GRAZING)

Impact	Loss of access to grazing				
Nature	Negative	Positive	Neutral		
	Exclusion of livestock from the development area and land clearance within the development area represents a decrease in the available grazing in the area				
Type	Direct	Indirect	Induced		
	Reduced access to grazing in the area will increase grazing pressure on surrounding areas and clearance of vegetation in the project area will reduce the available forage in the long term.				
Duration	Temporary	Short term	Long term	Permanent	
	Exclusion of camels for the duration of the project and clearance of vegetation in the project area activity represents a permanent loss.				
Extent	Local	Regional	National	International	
	Good grazing on site is very limited (estimated to be around 5 ha)				
Scale	The number of camels currently grazing on site is small (best estimate 2-9) and are only observed on site 20% of the time, and on each occasion is for a few hours. A conservative estimate is that there is sufficient forage on site to sustain less than one camel throughout the year.				
Frequency	One-off	Intermittent	Continuous		
	The exclusion of camels from the site will last for the lifetime of the project				
Magnitude	Positive	Negligible	Small	Medium	Large
	The magnitude will be negligible.				
Receptor sensitivity	Low	Medium	High		
	The sensitivity livestock owners residing in the Social AOI to loss of access to grazing is considered to be medium since they rely on income derived from raising livestock as their main source of income.				
Significance	Not Significant	Minor	Moderate	Major	
	The materiality of this impact is considered to be Minor, but due to the sensitivity of the issue measures are required to maintain good relations with the neighbouring community.				

Mitigation/management measures

Although the materiality of impacts from loss of grazing are assessed as being Minor, the following best practice management measures are required to maintain good relations with the local community and will be included in the CEMMP:

- The Project must be precisely delineated during the construction phase and any steps involving unnecessary occupation of areas outside the specified Project boundaries must be avoided.
- Post-ESIA engagement by the Community Liaison Officer appointed by the Project with the sheikh of Abu Thaylah to present the Project and its' impact on grazing access, and to verify and assess the ability of livestock owners to adapt to the restricted access to grazing areas taken by the Project. In the event that some livestock owners are not adaptable to the restriction, any necessary measures to counteract this will be developed in consultation with the sheikh, PDO, and the Wali's office.
- Design into the social development interventions provided by the Project to the local community that specifically provide relief to livestock owners in Abu Thaylah who are or who are perceived to be disadvantaged by the project.

- Regular engagement with the sheikh of Abu Thaylah during the construction and operational phases to maintain good communication and track sufficiency of social development interventions for those who are potentially disadvantaged by the Project.

Residual Impact Significance

By maintaining good relations with the community at Abu Thaylah the impact arising from the loss of grazing access on the site will remain Not Significant.

7.5.7.6 CONSTRUCTION AND OPERATION – INTRODUCTION OF INVASIVE ALIEN AND NOVEL SPECIES

The movement of equipment and vehicles to site has the potential to provide a pathway for the introduction of invasive alien species to the Project site and its immediate surroundings. The site, with respect to invasion of alien invasive species, is considered to be low risk because of the harsh desert environment in which it is located (Zefferman et al., 2015). Patzelt et al. (2022) has analysed the alien flora of Oman and provides a list of 110 alien plant species, of which the most invasive is *Prosopis juliflora* which has also been identified as significant in Saudi Arabia (Thomas et al., 2016). Of particular note is the authors' recommendation that areas around oil field accommodation (e.g. PDO camp at Qarn Alam) be systematically surveyed for alien species that have been introduced for ornamental or agricultural purposes. The most likely pathway for the spread of this species is by vehicles parked in the shade of this tree and for seed pods to be transported to site and released.

The following invasive plant species are present in drylands (Patzelt et al., 2022), and therefore have some potential to colonise gravel desert pains in the project AOI:

- *Alternanthera pungens*
- *Leucaena leucocephala*
- *Prosopis juliflora*

None of these invasive plants have been observed on site, but *Prosopis juliflora* has been observed in the AOI, particularly colonizing disturbed ground adjacent to roads. Alien invasive animal species that may be present in the project AOI include the House Crow *Corvus splendens*, the Common Myna *Acridotheres tristis* and the Ring-necked Parakeet *Psittacula krameria.* However, given the project activities and its ecological context, the risk of invasive plant species is considered to be the most probable.

The distinction is made between alien invasive species (AIS) and alien species such as *Conocarpus* sp. (the 'Kuwaiti' tree): Alien invasive species have a demonstrated potential to become established in the environment without human intervention, whereas alien species require human intervention (e.g., irrigation) to survive in arid environments.

Solar farms also provide resources that may change the structure of the local bird community by providing shade, nesting sites and perches that favor some species over those species that are well adapted to unmodified habitats (Bennun et al., 2021). However, given the habitat types in the project AOI and the general lack of available water, the risk of significant changes to the local bird community is considered negligible.

Given the climate and habitats present at the Project site, there is a relatively low likelihood of alien invasive species becoming established or disruption to the structure of the local bird community occurring.

Best practice with respect to food waste management and pest control have been assumed to manage these risks.

The magnitude of the risk is predicted to be small, with any consequential impacts on habitats (which are of low sensitivity) resulting in an overall assessment of this risk being Not Significant.

Impact Significance

With best environmental management practices in place, risks and impacts arising from the invasive species risk is predicted to be Not Significant.

TABLE 7.31 IMPACT ASSESSMENT SUMMARY: INTRODUCTION OF INVASIVE ALIEN AND NOVEL SPECIES

Impact	Introduction of invasive alien and novel species				
Nature	Negative	Positive	Neutral		
	If invasive alien species are introduced or novel species become established, there will be a negative impact on the local ecology.				
Type	Direct	Indirect	Induced		
	There will be a direct impact.				
Duration	Temporary	Short term	Long term	Permanent	
	Once introduced, invasive species are often very hard to eradicate. It is assumed that alien species introduced will colonise the area permanently unless controlled before they become established.				
Extent	Local	Regional	National	International	
	Introduced alien invasive plant species may spread from the Project site to the local area and vice versa.				
Scale	Only a small number of candidate species are currently present in in the project AOI. However, the nature of biological invasions is such that single reproductive plant of an alien species can quickly lead to the establishment of a population that then spreads to habitats in the surrounding AOI.				
Frequency	One-off	Intermittent	Continuous		
	The risk for alien species to be introduced is present whenever new equipment or vehicles move to and from areas that have already been colonised, so the risk is considered to occur over the lifetime of the project.				
Magnitude	Positive	Negligible	Small	Medium	Large
	The magnitude of impact will be small initially but will increase over time if left uncontrolled.				
Receptor sensitivity	Low	Medium	High		
	The sensitivity of habitats in the AOI is considered to be low due to the desert conditions, although some species (P. juliflora) are capable of colonising some habitat types (e.g., wadi beds in open terrain, drainage lines).				
Significance	Not Significant	Minor	Moderate	Major	
	The Project will entail vehicle movements during construction and operational phase, which represents the main, but not the only, pathway for alien invasive species to be introduced to the project area. The risk is considered Not Significant so long as best practice (an embedded mitigation measure) is followed.				

Recommended Measures

Although the materiality of this impact is assessed as being Not Significant, the following management measures and procedures are recommended to be considered in alignment with best practices and Project Standards during the construction and operations of the Project:

- Vehicles, equipment and materials arriving on site will be visually inspected prior to departure to site and on arrival on site (as part of the delivery confirmation/consignment note system) by the contractor's HSE team for presence of invasive species, particularly seed pods of *Prosopis juliflora*. Regular inspections for plant AIS that may become established (see below), should also be conducted. HSE officers are to receive a briefing about AIS risk (e.g., *Prosopis juliflora* seed pod identification and safe disposal etc.).
- Avoidance of *Prosopis juliflora* and other potentially invasive plant species in the landscaping palette to be planted on site, if applicable;
- Food waste will be stored in sealed bins and emptied regularly to minimise scavengers and fly infestation. Similarly, pest control measures (rodents, flies and, if necessary, mosquitos) will be implemented at the site offices, and awareness materials will be provided regarding hazardous wildlife (snakes, camel spiders, scorpions). This measure will be included in the Waste Management Plan; and,
- An invasive species management procedure will be implemented as part of the CEMMP and OEMMP, including checking of equipment prior to shipping to site and periodic monitoring for alien invasive species that may have established themselves on site. Visual inspection of the site for alien invasive every quarter throughout the construction phase, and regular inspections (annual) during the operational phase, need to be carried out.

Residual Impact Significance

With these mitigation measures in place, risks and impacts arising from the invasive species risk is predicted to remain Not Significant for the duration of the project.

7.5.7.7 CONSTRUCTION AND OPERATION – ACCIDENTAL LEAKS/SPILLS RESULTING IN DEGRADATION OF HABITAT

During construction and operation there is a risk of leaks and spills of materials or fuel to impact habitats and species. This assessment takes into consideration the embedded mitigation measures such as the secondary containment requirements of Oman legislation for bulk liquid storage, and customary best practice such as spill kits and best re-fueling practices. The most significant hazard is the bulk storage of diesel on site; details are not currently available so the assessment is based on the assumption that a 20,000 liter tank will be temporarily installed to service plant required for construction, and that there will be no fuel storage on site during the operational period. Other substances that may be stored on site during the operational period will include small volumes of paint, solvents and lubricants. This assessment considers the ecological risks only, but storm water and soil are both pathways that may cause ecological consequences. The risk of impact is predicted to have of small magnitude, since habitats of low sensitivity. Effects are predicted to be Not Significant.

Impact Significance

With embedded mitigation measures properly implemented, impacts will be Not Significant.

TABLE 7.32 IMPACT ASSESSMENT SUMMARY: ACCIDENTAL LEAKS/SPILLS RESULTING IN DEGRADATION OF HABITAT

Impact	Degradation of habitat from leaks and spills			
Nature	Negative	Positive	Neutral	
	There will be a negative impact from soil contamination and potentially toxic effects for flora and fauna in the affected area.			
Type	Direct	Indirect	Induced	
	There is potential for both direct and indirect impacts to occur.			
Duration	Temporary	Short term	Long term	Permanent

Impact	Degradation of habitat from leaks and spills				
	Spills could result in short or long term impacts before the contaminants most likely causing the spill physically or biologically degrade.				
Extent	Local	Regional	National	International	
	Volumes of liquid fuels and chemicals on site will be relatively small (up to 20,000 l for a catastrophic failure of above ground fuel storage tank and failure or partial failure of the secondary containment) will only affect a small area in the event of a spill.				
Scale	Spills will result in a local effect on a small area of habitat within the Project site, with some risk of a large spill flowing along storm water ditches.				
Frequency	One-off	Intermittent	Continuous		
	A number of control measures are embedded in the project description and the frequency of spills is predicted to be infrequent.				
Magnitude	Positive	Negligible	Small	Medium	Large
	The magnitude of impact will be small.				
Receptor sensitivity	Low	Medium	High		
	The sensitivity of terrestrial habitats on site and in the AOI is considered to be low.				
Significance	Not Significant	Minor	Moderate	Major	
	The impact on receptors will be small and the effect is considered to be Not Significant for terrestrial habitats.				

Recommended Measures

Although the materiality of this impact is assessed as being Not Significant, the following management measures are recommended to be considered in alignment with best practices and Project Standards. Management measures to reduce impacts on surface waters from accidental spills and leaks during construction and operation are set out in Section 7.5.1 and 7.5.2. Thesemanagement measures and best practice approaches will be incorporated into the construction of the Project and documented in the Project CEMMP and OEMMP, the Pollution Prevention and Control Plan:

- Oil, fuel and other construction liquids will be stored at designated areas with secondary containment of at least 110% of the storage vessel (as per Omani legislation), with adequately sized spill kits on hand for likely spill scenarios according to best practice guidelines and aligned with PDO Company standards;
- All refuelling will take place on hardstanding, and should re-fuelling be required for areas without hard standing (e.g. diesel generators and other ICE powered static equipment) drip trays will be put in place and spill kits available; and
- Disposal and clean-up of any contamination arising from spills or leaks will be in accordance with the mitigation measures in Section 7.5.1.

Residual Impact Significance

With all mitigation measures properly implemented, impacts will be Not Significant.

7.5.7.8 OPERATION – BIRD COLLISION RISK WITH SOLAR PANELS

In the section describing the scope of this assessment it was reasoned that the lake effect hypothesis is unlikely to occur given the lack of evidence. However, as reported by Bennun et al. (2021) long term data from multiple solar farms in USA indicate that the average annual fatality rate for birds colliding with solar panels was 2.49 birds per MW per year. Abundance and diversity of birds at the North Solar Farm site is a small fraction of that in western US where this evidence originates, as supported by the results of bird drive over surveys

conducted on site in May 2024. Taking a conservative estimate that 10% of the annual mortality rate seen in USA occurs on site, bird mortalities arising from collisions with solar panels at the project is estimated to be 25 birds per year. The species affected are expected to be mostly passerines and Hirundines (Swifts and Martins) and most impact is expected to occur during the autumn and spring migration period, although it is possible that migrating water birds may also be affected. Species are likely to be of least concern, so sensitivity of the receptor is low. Embedded mitigation includes the perimeter fencing that will be clad with shade netting, which reduces the likelihood of collisions from birds flying fast at low altitude from entering the site. Impacts are predicted to be of small magnitude on receptors of low sensitivity/value and will be Not Significant.

Impact Significance

The magnitude of impacts on common and widespread bird species that are most likely to be affected (low sensitivity) will be small (25 mortalities per year), with the overall assessment being Not Significant.

TABLE 7.33 IMPACT ASSESSMENT SUMMARY: BIRD COLLISIONS WITH SOLAR PANELS

Impact	Mortality and injury to birds colliding with solar panels				
Nature	**Negative**	Positive	Neutral		
	Collisions will result in injury or mortality to birds				
Type	**Direct**	Indirect	Induced		
	Collisions are caused by solar panels, so are direct impacts.				
Duration	Temporary	Short term	**Long term**	Permanent	
	Collision risk will occur throughout the operational period of the project.				
Extent	**Local**	Regional	National	International	
	The risk only relates to solar panels on site, so only birds that are resident or migrating through the area are exposed to the risk attributable to the project.				
Scale	A conservative (over-estimate) of the number of bird mortalities is 25 per year.				
Frequency	One-off	**Intermittent**	**Continuous**		
	Bird collisions may occur at any time of the year, but more birds are exposed to the risk during migration seasons. Collision risk will vary according to weather conditions on site and time of day.				
Magnitude	Positive	**Negligible**	Small	Medium	Large
	The magnitude will be small.				
Receptor sensitivity	**Low**	Medium	High		
	The conservation status of birds exposed to collision risk is expected to be dominated by species of least concern, but more threatened species may also be affected.				
Significance	**Not Significant**	Minor	Moderate	Major	

Recommended Measures

Although the materiality of this impact is assessed as being Not Significant, the following management measures are recommended to be considered in alignment with best practices and Project Standards

- If high bird mortality rates are observed, a bird management plan will be developed and implemented, to include a measure of effectiveness of mitigation and deterrent measures that are implemented.

Residual Impact Significance

The prediction of impact before mitigation is predicted to be Not Significant. Monitoring is required to test this prediction and, if necessary, will inform adaptive management that will control the risk sufficiently for any impacts arising to remain Not Significant.

7.5.7.9 OPERATION – BIRD COLLISION AND ELECTROCUTION RISK WITH OVERHEAD TRANSMISSION LINES AND OTHER PROJECT ELEMENTS

Bennun et al. (2021) indicate that the risk of electrocution is greatest on low and medium voltage lines (also see Lehman et al., 2007), and that electrocutions are rarely significant on high voltage transmission lines. This is borne out by research conducted by Dr Mike McGrady on Egyptian Vultures and other large raptors in Oman which has determined that electrocution risk to these species is greatest on 11 kV distribution lines since energized components are arranged in such a way that allows electrocution of birds having a wing span above a particular threshold. Electrocution risk on 132 kV transmission lines is negligible since energized components are typically separated by 157 cm which is greater than wing spans of most bird species in Oman (5OES, 2009).

Therefore, only bird collision risk with 132 kV OHL from the step-up substation to the off-take sub-station at Saih Nihaydah (a distance of 5 km) is considered in this assessment. Collision risk with perimeter fencing is considered negligible since it will be clad with shade netting and will therefore be highly visible. Other collision risks include those with project vehicles, which is also considered negligible since speed is limited to 60 km on unpaved roads in PDO concession areas, and little or no vehicle movements will be permitted after nightfall. Overhead lines provide some benefit for some species of birds by offering perches, nesting opportunities and shade, and use of these attributes has been observed in the AOI during drive over surveys in May 2024, when Brown-necked Ravens *Corvus ruficollis* were recorded nesting in existing 132 kV lattice towers around 8 km from the project site.

In Oman's central deserts birds typically migrate over a broad front due to the lack of landscape features such as mountain ranges, rivers or the coast. However, water birds will be attracted to surface water bodies in the project AOI at which to stop over and feed as they migrate southward in autumn and northward in spring. Permanent surface water bodies are present around 20 km to the southwest of the project, on approximately the same bearing as the OHL connecting the project with the offtake sub-station at Saih Nihaydah, and therefore migrating water birds will generally fly parallel to it rather than needing to cross it. After rain events natural surface water bodies form after rain events, including ponding in the wadi system 6.5 km to the south east of the project site. When present feature could potentially attract migrating birds across the alignment of the OHL, increasing collision risk to some degree if significant rain falls in the weeks leading up to or during the two migration seasons. Surface water was present for around six weeks following heavy rain in mid-April 2024, but the length of time that ponding persists will vary according to the volume of rain and weather conditions (air temperature and wind speed).

The factors which affect the risk of bird collisions with power transmission infrastructure can be divided into three categories: those related to the birds, those resulting from environmental conditions and those caused by the configuration and location of the power lines (APLIC & USFWS, 2005). Factors relating to the birds themselves include body size and structure (including wing aspect ratio), flight behaviour, age, sex, flocking behaviour and habitat use (APLIC & USFWS, 2005; Bevanger, 1998). Birds with a high wing loading, less agile birds and

those occurring in substantial flocks are exposed to an increased risk of collision as they are less able to react quickly in order to avoid unexpected obstacles (APLIC & USFWS, 2005). Despite birds with high wing aspect ratio and low loading, such as gulls, being relatively agile they may be susceptible to being blown into lines by strong winds (Bevanger, 1998). Birds involved in activities such as courtship or hunting and inexperienced birds are more likely to be distracted and thus prone to collisions (APLIC & USFWS, 2005).

Although not all transmission line collisions are immediately fatal, the injuries which are sustained can cripple birds to the extent that they are no longer able to function properly (feed, avoid predators etc.) which ultimately results in mortality. Many species which are regular victims of power line collisions are long-living, slow breeding birds. Research conducted in Spain revealed that less maneuverable species belonging to the Gruiformes group (moorhens, coots, crakes, rails, cranes and bustards) are more prone to collisions (Janss & Ferrer, 1998) while research by Bevanger (1998) suggests that coastal and other water birds are also at risk.

Bird collisions with overhead lines are not well documented in Oman so bird collision rates are not known, but two examples are given as evidence that such collisions do result in bird mortality. A Steppe Eagle (*Aquila nipalensis*) was documented with trauma to its wing following a suspected collision with 132 kV transmission line in Dhofar (5OES, 2009), which was later euthanized. Another case of a fatal Flamingo collision with 132 kV OHL has been documented following a bird carcass survey in Duqm (5OES, pers comm.). A meta-analysis of nine studies of bird collision rates in different countries (Rioux et al., 2013) reported a preliminary rate of 42.3 bird fatalities per km per year. Applying this rate to the 5 km of OHL associated with the project indicates that 210 birds may be affected by collisions with the OHL each year. The majority of species likely to be impacted are expected to be of least concern. However, given the local context this assessment considers large raptors (including the endangered Egyptian Vulture *Neophron percnopterus* (EN) and large waterbirds such as the Lesser Flamingo *Phoeniconaias minor* (NT) to be the most sensitive species at risk. Both species are known to occur in the Bird AOI in low numbers. Mortalities of sensitive species is expected to be less than one of each species per year.

Impact Significance

The impact will be Not Significant.

TABLE 7.34 IMPACT ASSESSMENT SUMMARY: BIRD COLLISION AND ELECTROCUTION RISK WITH OVERHEAD TRANSMISSION LINES AND OTHER PROJECT ELEMENTS

Impact	Mortality and injury to birds from collisions with OHL and other project elements			
Nature	Negative	Positive	Neutral	
	Collisions with electrical infrastructure may cause injury or mortality to some bird species.			
Type	Direct	Indirect	Induced	
	Collision with and electrocution by project elements will be a direct impact.			
Duration	Temporary	Short term	Long term	Permanent
	.			
Extent	Local	Regional	National	International
	The collision risk applies to the OHL which has a length of 5 km and so is considered to have a local extent			

Impact	Mortality and injury to birds from collisions with OHL and other project elements				
Scale	Impacts will only occur along the OHL alignment and associated sub-stations.				
Frequency	One-off	Intermittent	Continuous		
	Collision risk will persist for the operational phase of the OHL so is considered to be continuous				
Magnitude	Positive	Negligible	Small	Medium	Large
	The numbers of birds affected (magnitude) is expected to be small.				
Receptor sensitivity	Low	Medium	High		
	The sensitivity of the majority of birds exposed to the risk of collision with OHL is low due to their Least Concern conservation status, but some species at risk range from Near Threatened to Endangered which represents medium and high sensitivity.				
Significance	Not Significant	Minor	Moderate	Major	
	The significance of this impact is assessed as being Not Significant.				

Recommended Measures

Although the materiality of this impact is assessed as being Not Significant, the following management measures are recommended to be considered in alignment with best practices and Project Standards:

- Shade netting to be attached to the NOS perimeter chain-linked fencing

Residual Impact Significance

Recommended monitoring will not alter the impact significance, which will remain Not significant, and will increase the level of certainty associated with the predicted impact assessment.

7.5.7.10 REPOWERING AND/OR DECOMMISSIONING – ECOLOGICAL RISKS AND IMPACTS

The project is being procured using a BOOT model, so it will be handed over to PDO at the end of an initial operational phase. PDO will then operate the facility until the end of the project cycle. Therefore, the responsibility for decommissioning will be transferred to PDO, and PDO company standards (alongside national legislation) will then inform the manner and performance criteria that will control the decommissioning process, rather than IFC Standards. The ecological risks and impacts of decommissioning will therefore need to be assessed not less than two years before the facility is due to stop operations, in the context of applicable national legislation and PDO company standards at that time.

Repowering (i.e., replacement of solar panels at the end of the design life, and potentially other project elements), potentially to be undertaken by PDO after the project is handed over to them under the BOOT model, will carry a sub-set of ecological risks as occur in the construction phase such as ecological consequences of regarding disturbance and contamination, elevated risk of AIS introduction etc. Impacts from repowering phase will be assessed later if repowering is the selected option (the Design Change Management Procedure will be applied).

Should PDO elect to re-power the project, it is recommended that EA is re-engaged by PDO to understand EA's requirements in terms of updating the environmental permit to the project

and to clarify the mechanism for meeting their requirements with respect to the assessment of environmental impact.

7.5.7.11 TERRESTRIAL BIODIVERSITY IMPACT SUMMARY

A summary of the effects on ecology and biodiversity receptors is presented in Table 7.35.

TABLE 7.35 SUMMARY OF EFFECTS ON TERRESTRIAL ECOLOGY AND BIODIVERSITY

Impact	Project Phase	Pre-mitigation	Residual
Site Clearance Resulting in Loss and Fragmentation of Habitats	Construction	Minor	Not Significant
Loss of Ecosystem Services (Grazing)	Construction and Operation	Not Significant	Not Significant
Introduction of Invasive Alien and Novel Species	Construction and Operation	Not Significant	Not Significant
Accidental Leaks/Spills Resulting in Degradation of Habitat	Construction and Operation	Not Significant	Not Significant
Bird Collision Risk with Solar Panels	Operation	Not Significant	Not Significant
Bird Collision Risk with Overhead Transmission Lines	Operation	Not Significant	Not Significant

The impact assessment takes into consideration mitigation measures already embedded into the project design, which reduce many of the impacts and risks that would occur in a project without embedded mitigation measures.

7.5.8 PROTECTED SPECIES / CRITICAL HABITAT (PS/CH)

7.5.8.1 PROTECTED AREA IMPACT SUMMARY

The basis for the assessment is the IBAT report commissioned for the North Oman Solar project which states that there are no protected areas and no key biodiversity areas within 50 km of the project. No impacts to protected areas or key biodiversity areas are predicted to occur that are attributable to the project. Similarly, no critical habitat occurs at the project site or in the area that may be impacted by project activities.

7.5.8.2 PROTECTED SPECIES IMPACT SUMMARY

The IBAT Report refers to four species, all birds, that are potentially found in the area of interest (50 km AOI):

- Saker Falcon *Falco cherrug*
- Egyptian Vulture *Neophron percnopterus*
- Lappet-faced Vulture *Torgos tracheliotos*
- Steppe Eagle *Aquila nipalensis*

Saker Falcon

The Saker Falcon breeds from central Europe to central Asia, including Southern Iran (Gallagher & Woodcock, 1980; Porter et al., 1996), and is widely spread but scarce. In Oman it is considered to be a passage migrant and winter visitor from September to April, but Eriksen et al (2003) report that it is also present over the summer months in small numbers. Gallagher & Woodcock (1980) describes its occurrence in Oman as 'not common but probably regular'. Its preferred habitat is lightly wooded steppe, foothills and mountains, and semi-desert areas, resting on the ground, crags and trees (Porter et al., 1996), but Sargent et al. (2008) describe its distribution in Oman as having no pattern and its presence can be expected anywhere. In the Oman Bird Records Committee files, 130 records of Saker Falcon appear from 1986 – 2003, which should not be interpreted as a population estimate but rather provides an indication of its low incidence.

Saker Falcons have traditionally been trapped by falconers in the Gulf region, which accounts in part for its endangered conservation status. Falconry remains popular in UAE, Qatar and Saudi Arabia, but is not common practice in Oman.

Being a small, agile falcon with excellent vision, the Saker Falcon is not likely to be at significant risk from collisions with 132 kV overhead lines, although it is vulnerable to electrocution on medium and low voltage distribution lines (which are not part of the North Oman Solar project description). Given the low likelihood of this species being present at the site and its low vulnerability to collision risk, the impact to this species is considered to be negligible.

Egyptian Vulture

Egyptian Vultures are globally threatened (IUCN EN). Their global distribution extends from Turkey to Iran, and includes breeding populations in the Hijaz Mountains of Saudi Arabia and Yemen, as well as more isolated breeding populations in Northern Oman, Masirah Island and Socotra Island (Yemen). Egyptian Vultures are seen in Oman throughout the year, with numbers fluctuating seasonally as the migrating birds from Eurasia joins the resident population in October and November in Northern Oman to over winter (Gallagher & Woodcock, 1980). Their habitat is described as mostly mountains with gorges and wadis, and as scavengers they frequent refuse dumps to feed.

The resident breeding population in Oman is relatively small, described by Gallagher & Woodcock (1980) as uncommon. Breeding takes place in the Hajar Mountains in northern Oman (with the cliffs of Wadi Sarin being a stronghold) and Masirah Island in February and March. The breeding population in Arabia is estimated to be 4000 individuals, of which around 1900 are found on Socotra, with an estimated population decline of 30-49% over the past 42 years (Symes, et al., 2015). Nests are generally constructed on a cliff edge, shallow cave or ledge or rarely on a tree or building, on hills or mountains inland and on coasts and islands (Gallagher & Woodcock, 1980). However, Sargent et al. (2008) describe the Egyptian Vulture as 'an abundant passage migrant and winter visitor, especially to north Oman, as well as a widespread but uncommon breeding resident' which indicates that migrating birds form the majority of the population observed in Oman.

Porter et al. (1996) show the range of Egyptian Vultures in Oman as being limited to Northern Oman and Masirah Island, which reflects the distribution of the breeding population. However, vultures often range over huge areas in search of food, especially before they become

breeding adults and outside the breeding season. Migrants are also present in the mountains of Dhofar over the winter months. Their migratory behaviour combined with their large home ranges indicate that Egyptian Vultures are expected to transit the site, and although this species has not been observed from the site to date, records from the Oman Bird Records Committee show that it occurs in the project AOI. However, habitats in the AOI are not well suited to Egyptian Vultures, so they are expected to be soaring while searching for food, occasionally descending to feed or water.

It is therefore expected that resident Egyptian Vultures may visit the Project Site infrequently, but migratory animals may pass over the site in autumn and spring. Given their soaring flight pattern, it is unlikely that they will interact with the project unless they descend to feed or water. The assessment of impact arising from collisions with overhead power lines above, considers the risk of sensitive species (including but not limited to Egyptian Vultures) to be Not Significant, with a conservative estimate of one bird mortality per year. The risk specifically to Egyptian Vultures is therefore very small with a possibility of one mortality caused by collision with OHL over the lifetime of the project.

Lappet-Faced Vulture

Porter et al., (1996) describe the Lappet-Faced Vulture's distribution in the Arabian region as being mainly resident in small populations, identifying the Hajar Mountains, Musandam (Oman) and the Jebal Hafeet area in UAE and the central deserts of Saudi Arabia as the three main populations. The global population is estimated at 9000 individuals, and a count of birds at four breeding locations in Oman in 2007 recorded 102 individuals (cited in Symes et al., 2015), indicating that the total population in Oman is no more than a few hundred. Their preferred habitat is described as semi-desert Steppe, savannas and rocky wadis, and nesting is typically in *Vachellia* (*Acacia*) trees which is confirmed but uncommon in Dhofar (Gallagher & Woodcock, 1980), Hajar Mountains (e.g., Jebal Shams, Saiq Plateau) and Jebal Madar near Sinaw (Sargent et al. 2006), all of which located more than 150 km away from the project site. It feeds on carrion, but like other scavenging species it is often found at waste disposal grounds such as Sunub (Eriksen et al., 2003).

The Lappet-Faced Vulture has not been observed on site, and both Eriksen et al. (2003) and Porter (1996) show that the project site does not support resident breeding populations. Satellite tracking of an individual animal trapped in Jebal Akhdar (ESO, unpublished data) shows that its range covers around 3000 km^2, radiating out around 50 km in all directions from a central point (Figure 7.5). With the North Oman Solar project site being more than 150 km from this species' known breeding range, individuals may be observed at the site but only rarely.

Any interaction with the project and its associated facilities is highly unlikely, and the risk to this species is therefore considered negligible.

FIGURE 7.5 RANGE OF A LAPPET-FACED VULTURE IN HAJAR MOUNTAINS, OMAN

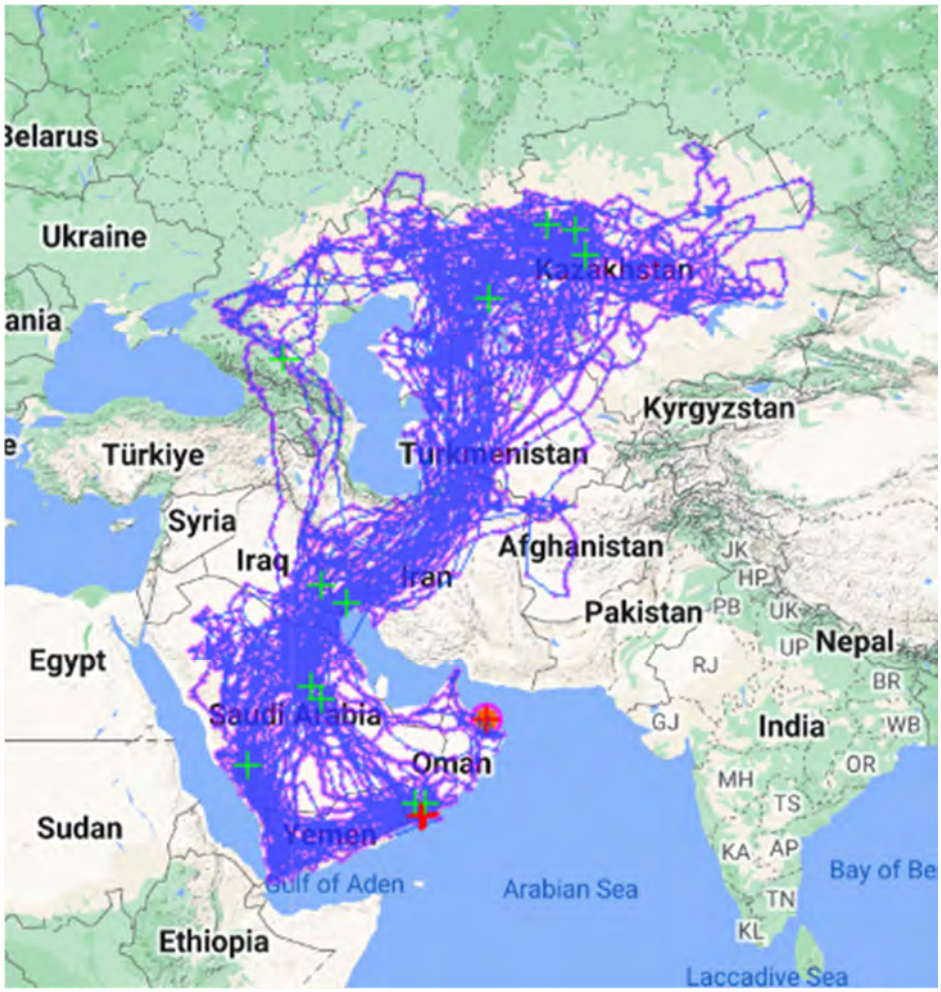
Source: ESO, courtesy of Dr Mike McGrady, 2023.

Steppe Eagle

This species has a large global distribution, with breeding populations in Africa, SE Europe, SE Iran to India and Myanmar (Gallagher & Woodcock, 1980). The Steppe eagle is a common passage migrant and winter visitor from late September to early April, with a peak in November. They are rarely seen in other months (Sargent, et al., 2008; Eriksen et al., 2003). This is the most numerous eagle wintering in Oman, which is usually seen singly or in small numbers, although concentrations occur at rubbish dumps and landfill sites. Recent satellite tracking of Steppe Eagles in Oman by Mike McGrady and co-workers (pers comm., see Figure 7.6) show that the migrant population that overwinters in Oman breed in Kazakhstan and generally migrate along the east of the Caspian Sea, though NW Iran and into NE Arabia where they radiate along three routes: i) Eastward to the Central Red Sea and south to the Hijaz Mountains, turning east in Yemen and arriving in Dhofar from the west, ii) south across the open desert of Saudi Arabia and over the Empty Quarter to Dhofar, and iii) a relatively small number follow a route that tracks the coast of the Arabian Gulf and into northern Oman via the Hajar Mountains. Some Steppe Eagles may migrate to Dhofar from northern Oman, a route that would take them over the North Oman Solar project site. Steppe Eagles have not been observed at the site to date, but are expected to occur in small numbers as they migrate south to Dhofar from the north. As with the Egyptian Vulture, their soaring flight pattern means it is

unlikely that they will interact with the project unless they descend to feed or water., the assessment of impact arising from collisions with overhead power lines above, considers the risk of sensitive species (including but not limited to Steppe Eagles) to be Not Significant, with a conservative estimate of one bird mortality per year. The risk specifically to Steppe Eagles is therefore very small with a possibility of one mortality caused by collision with OHL over the lifetime of the project.

FIGURE 7.6 SATELLITE TRACKS OF STEPPE EAGLES IN THE ARABIAN REGION



Source: M. McGrady (pers. Comm., 2024)

The only other species which warrants inclusion in this section on protected species is the Arabian Red Fox (*Vulpes vulpes arabica*), which is protected under Appendix II of Royal Decree 114/2001, along with all other mammalian wildlife species. This species has been observed in the project AOI, and although not observed on site, drive over surveys have noted some signs of its presence e.g. abandoned dens. This species is widespread throughout Oman, relatively common and has been assessed as least concern on the Global IUCN Red List as well as in the Arabian Red List of Carnivores, so is included here because it is listed in RD 114/2001, the law on Pollution Prevention and the Conservation of the Environment. The impact to this species

has been included as a component of habitat losses caused by clearing and levelling during the early phase of construction, with the assessment finding that foxes in the AOI will be excluded from accessing the project area by fencing, removing a small area (0.025 km^2) of its likely home range (50 km^2), and introducing a barrier that will fragment its habitat to a very minor degree. The magnitude of these impacts is negligible and are assessed as being Not Significant.

7.6 SOCIOECONOMICS

This section presents the assessment of potential socioeconomic impacts associated to the construction, operation, and decommissioning /repowering phases of the Project.

7.6.1 SCOPE OF THE ASSESSMENT

The following potential socioeconomic impacts are considered to have either no or insignificant effect and have therefore been excluded from further assessment:

- Impacts on Economy, Employment and Income
  - Impacts on local price inflation

    Potential increases of prices within the AoI, as a result of procurement of goods and services by the Project, are scoped out because the AoI is not characterised by economic activities which could supply the Project. It is therefore anticipated that the Project will procure goods and services from wider areas beyond the AoI and will therefore not be leading to any price inflation in the AoI.

  - Decrease of Tourism potential and Recreational Activities

    Potential impacts determined by a decrease in tourism, as an economic activity, and recreational activities are scoped out considering that the AoI is not important for tourism as it lacks any tourist and/or recreational attractions.
- Impacts on Education
  - Impacts on Education Levels

    The benefits of potential Project employment as an added incentive for educational attainment are scoped out considering that employment opportunities offered by the Project are mostly short-term and are not considered to be perceived as an incentive for community members to achieve higher rates of educational attainment in the AoI so that they quality as potential candidates to work for the Project.

  - Impacts on Education Services and Facilities

    The potential impacts on education services and facilities are scoped out because there are no education facilities in the AoI. Additionally, it is unlikely that Project workers will bring their families, as construction employment will be short-term while operational employment will be limited.
- Impacts on Infrastructure and Public Services
  - Housing Availability and Affordability

    The potential decrease in housing availability and affordability, within the AoI, as a result of Project workforce accommodating in local dwellings is scoped out, given that non-local workers will likely be accommodated in the already-existing PDO accommodation camps, or if necessary, in temporary camps set up by Project contractors.

  - Impacts on Water and Sanitation

    The potential impacts on local water availability are scoped out considering that, should the preferred accommodation arrangement be PDO's permanent accommodation camps these are assumed to already have a supply of water. The exact capacity of these accommodation camps is not known at this stage. If a temporary camp within the Project site is chosen, given the low population density in the AoI and the short duration of the construction

period (17 months), it is not anticipated that any potential increases in water demand could significantly affect water availability for those living within the AoI. According to the information provided by the Project Proponent, water will be transported to site from known and secured sources via water tankers.

Similarly, the potential impact on local sanitation is scoped out considering that sewage from workforce accommodation and Project activities is assumed to be collected and further managed by a certified company, thus avoiding impacts on local sanitation.

- Impacts on Energy Infrastructure

The potential impact on local energy infrastructure is scoped out considering that the Project energy output will not feed energy into the national grid but rather energy will be used to power PDO facilities only.

- Impacts on Waste Infrastructure

The potential impacts on the existing waste infrastructure are scoped out, considering embedded waste management measures, including segregation for collection and disposal by specialist contractors at equipped and approved sites, which align with national and international requirements. Therefore, waste management associated with the Project is not deemed to cause issues in terms of how waste is managed within the AoI.

- Impacts on Community Health, Safety and Security
  - Impacts on Community Health from Project-related Noise

Impacts arising from construction, decommissioning or repowering noise are scoped out as noise effects are unlikely to occur considering the substantial (about 4.9 km to Saih Nihaydah contractor camps) separation distance between the Project site and the nearest receptors (see Section Acoustics). Impacts arising from operational noise are scoped out given the low noise emissions and the great distance between the nearest receptors and the Project site. The separation distance between the Project site and the nearest receptors, make these extremely unlikely.

- Impacts on Community Health from Air Emissions

Impacts on community health arising from construction dust are scoped out considering there are no permanent sensitive receptors in the Project AoI for air quality. The nearest permanent receptors (workers at Saih Nihaydah contractor camps) are located at approximately 4.9 km to from the Project site, while the nearest PDO accommodation camp is located outside the Project AoI. The Project impact on local air quality has been deemed 'Minor to Medium prior to mitigation measures, and 'Not significant to Minor' after the implementation of mitigation measures.

- Impacts on Community Safety associated with Public Access to the Solar PV Farm

The potential for impacts on community safety arising from public, unauthorized, access to the Solar PV farm or to the Project substation, is scoped out considering that it is expected that the Project site will be fenced during construction and operation. The Project site is expected to also be fenced during decommissioning or repowering. Furthermore, the risk remains low because the Project is located in an oil and gas concession and the AoI is not heavily populated. Moreover, there are no places of tourist or religious attraction nor any public rights of way within the AoI and/or close to the Project site.

- Impacts on Security

Potential impacts on the security of the population within the AoI are scoped out, considering that opposition to the Project is not anticipated to arise and, therefore, demonstrations that could lead to property damage or physical injury to community members and/or Project staff are unlikely. Consequently, the need for a response involving use of force by Project and/or public security staff is also unlikely.

- Impacts on Land Use and Ownership (physical and economic displacement)

Potential physical displacement impacts resulting from acquisition of land required for the Project are scoped out considering that the Project site is owned by the Oman Government and leased to PDO via a Concession Agreement. Rights to use the land will be transferred to the Project Proponent via a usufruct agreement. The Project will not require any land outside the PDO leased areas, e.g. the Project will not need to access land owned by the nearest settlement (Abu Thaylah) and will therefore not determine any relocation of households or other structures.

- Potential impacts on economic displacement resulting from use of the land required for the Project are scoped out considering that the impacts arising from the loss of grazing are assessed as 'Minor' prior to mitigation measures, and 'Not significant' after the implementation of mitigation measures (see Section 7.5.7 Terrestrial Habitats, Flora and Fauna). Although the sensitivity of owners of livestock is considered to be medium due to their ability to locating similar land elsewhere, the management measures proposed to address the loss of ecosystem services are considered sufficient to verify and assess the ability of owners of livestock to adapt to the restriction on accessing grazing areas affected by the Project Impacts on Cultural Heritage

Potential impacts on tangible cultural heritage are scoped out considering that no tangible cultural heritage is known to be present within the Project's AoI defined for this topic. Impacts on intangible cultural heritage are also scoped out considering that there are no places of worship, specific traditions or festivities within the Project's AoI. The Project will not use cultural resources, knowledge, innovations, or practices of local communities embodying traditional lifestyles for commercial purposes; therefore, impacts associated with the Project's use of cultural heritage resources are also scoped out.

The following sections present the assessment of potential impacts anticipated to arise during the construction and/or operation phases of the Project.

7.6.2 IMPACTS ON ECONOMY, EMPLOYMENT AND INCOME

7.6.2.1 SCOPE OF THE ASSESSMENT

This section assesses the following potential impacts of the Project on economy, employment and income:

Project phase	Activity with potential impact
Construction	• Employment of personnel leading to impacts on direct employment
	• Procurement of goods and services for the Project and local spending of the Project workforce leading to economic impacts
Operation	• Employment of personnel leading to impacts on direct employment
	• Payment of taxes by the Project leading to economic impacts
Decommissioning	• Employment of personnel leading to impacts on direct employment

Project phase	Activity with potential impact
	• Procurement of goods and services for the Project and local spending of the Project workforce leading to economic impacts
Repowering	Similar to Construction and Decommissioning phases

7.6.2.2 IMPACTS ON DIRECT EMPLOYMENT

This impact refers to the potential benefits from direct employment of the workforce on the Project. There is a risk that skilled labour would be sourced from further afield, meaning that the population in the AoI and/or local communities in its vicinity would not fully benefit from the Project.

Sensitivity of the receptors

Receptors of this impact are people accessing jobs with the Project, whether men or women or youth in general.

Unemployment is not as high in Wilayat of Adam compared to other Wilayats. At the time of writing this report, current statistics of jobseekers officially registered with the Ministry of Labor, were yet to be confirmed by the Wali of Adam. According to feedback received from local government representatives during the stakeholder engagement meeting at the Wali's Office of Adam on July 14, 2024, the primary sources of income in the AoI and surrounding areas in the Wilayat of Adam include selling camels and private sector jobs in oil and gas companies operating in the area. Employment rate amongst residents of the Wilayat is dependent on the job opportunities and roles available and the profile of jobseekers. Some residents of the Wilayat of Adam hold Master's and PhD qualifications. Employment opportunities generated by the oil and gas sector are perceived as limited, due to the centralized system for recruitment used by oil and gas companies. Stakeholders anticipate various benefits from the Project, including jobs for locals in roles such as waste transport and solar panel cleaning.

The skills of laborers involved at Abu Thaylah are likely centered around livestock and animal husbandry, and agriculture. Many residents of the Wilayat of Adam may share similar skill sets, while others may possess administrative, commercial and even scientific abilities considering feedback around the qualifications of some residents as mentioned in the paragraph above.

In Oman, the unemployment rate of women (age group 15+) is significantly higher than that of men in the same age group (13.7 percent compared to 1.70 percent according to 2023 media reports). The Wali of Al Jazer noted that women in Al Jazer are largely employed in the public sector, and women comprise around 50 percent of public sector employees.

Access to job opportunities remains a significant challenge for Omani youth, both male and female, as reflected in youth unemployment statistics. Male youth generally have greater opportunities with fewer social barriers to entry, particularly in the oil and gas sector and manufacturing sectors. According to World Bank estimations, unemployment among the Omani youth was 49 percent in 2019, making job creation a critical challenge for Oman. A recent World Bank report confirmed that unemployment remains higher among Omani youth aged between 15 and 24, particularly among young women. Due to the nature of this impact being experienced as a direct positive impact, the proportion of waged employment at the wilayat level is expected to increase and the consequent livelihood and lifestyle standards. Receptors

are therefore considered to exhibit a **Medium** degree of sensitivity to (positive) change in direct employment opportunities.

More sensitive receptors are likely to be youth and women (vulnerable groups), whose lives would significantly change if benefiting from waged employment opportunities and fixed incomes, but who may also have more difficulties in accessing such opportunities compared to men, considering the traditional roles that exist in local society. It is expected that these receptors will exhibit a **High** degree of sensitivity to (positive) change in direct local employment opportunities.

Construction, Operation and Decommissioning/Repowering Phases

The Project will employ approximately 500 people at peak of construction activity and will seek to engage locally based construction workers, where feasible (e.g. low-skilled labourers). Due to the small population in the only settlement located within the social AoI (Abu Thaylah, which according to 2020 data, had a population of 161 people, 57 percent of which are omanies), it is likely that the Project and its contractors will seek to employ from other areas of the wilayat and/or governorate as well as from outside Oman where training and capacity building is not sufficient. The required workforce for decommissioning/repowering activities is assumed to be similar in size to that of the construction phase.

During operation, the Project will require up to 10 full-time staff (plant manager, electrical engineer, two PV technicians, cleaning robot operator, QHSE Manager, performance analist/asset manager, and an administrative role responsible for procurement, accounting and human resources) to keep the facility maintained and working. Considering the roles required to operate the Project, it is likely that very few staff requirements will translate into job opportunities for the few residents within the AoI. Some maintenance jobs may be lost at the end of the operations phase.

The benefits of job creation result in a combination of different outcomes such as income and subsequent access to resources, as well as psychological benefits such as role and status, access to social networks and support.

Direct employment during the construction and operations phase will be a ‘direct’, ‘positive’ impact which is expected to be a low increase within the wilayat and governorate areas. The duration of employment would vary from job to job, but overall employment would remain ‘temporary’ (17 months) during the construction phase and decommissioning (six months), ‘long-term’ during the operation phase (18 years). If project is decided to enter in the Repowering phase instead of decommissioning phase, the overall duration is considered the same than for construction phase.

Considering the factors above, potential direct local employment and associated economic development benefits are expected to be ‘**Positive**’, and as such a magnitude rating is not assigned.

Impact significance

Whilst the impact magnitude is not assigned considering this is a **Positive** impact, it is still likely that the impact significance will be felt more acutely during both construction and operation by vulnerable groups (youth and women) who under baseline conditions do not typically have access to waged employment opportunities in industrial sectors as do men.

TABLE 7.36 IMPACT ASSESSMENT SUMMARY: IMPACTS ON DIRECT EMPLOYMENT DURING CONSTRUCTION

Impact	**Impacts on direct employment during construction**				
Nature	Negative	Positive	Neutral		
Type	Direct	Indirect	Induced		
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low	Medium	High		
Significance	Positive				

TABLE 7.37 IMPACT ASSESSMENT SUMMARY: IMPACTS ON DIRECT EMPLOYMENT DURING OPERATIONS

Impact	**Impacts on direct employment during operations**				
Nature	Negative	Positive	Neutral		
Type	Direct	Indirect	Induced		
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low	Medium	High		
Significance	Positive				

TABLE 7.38 IMPACT ASSESSMENT SUMMARY: IMPACTS ON DIRECT EMPLOYMENT DURING DECOMMISIONING/REPOWERING

Impact	**Impacts on direct employment during decommissioning/repowering**				
Nature	Negative	Positive	Neutral		
Type	Direct	Indirect	Induced		
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low	Medium	High		
Significance	Positive				

Enhancement Measures

The following mitigation measure was included in the local EIA, considering that a social baseline was missing at the time – this measure is now outdated:

- Undertake a social baseline and impact assessment, develop suitable mitigation measures.

Good international industry practice and operational management should be able to further enhance the potential positive local economy and employment impacts of the Project. The following enhancement measures will be implemented:

- Develop a Local Content Plan to include the following commitments:

- The Project will work with local authorities and employment organisations to ensure that all positions are advertised in a manner that is accessible to the population in the AoI and in the Wilayat of Adam, by publicising the employment opportunities through the Wali's office.
- The Project will ensure that the recruitment process is fair and transparent, public and open to all regardless of ethnicity, religion or gender by providing clear job descriptions focused on skills and qualifications, using diverse sourcing channels to reach underrepresented groups (i.e., through the Wali's office, jobseeker registration at the Ministry of Labour), and implementing a standardized application process. The Project will include equal opportunity statements in all job postings, actively monitor the recruitment process, and ensure alignment with legal requirements to promote fairness and inclusivity.
- The Project will agree an Employment Strategy with Primary Contractors that will include the expected level of local input for unskilled labour. Contractors will be required to attempt to source all unskilled labour from within Oman, and with best efforts to recruit unskilled labour as well as skilled labour to the extent possible from the Social AoI and the Wilayats of Adam. Agreed measures will be monitored and reported on.

- The Stakeholder Engagement Plan developed for the Project will be regularly updated and will be implemented to outline how the Project will ensure regular, open and transparent communication with all stakeholders, concretely:
  - To provide clear information on the number and limited timescales of employment opportunities.
  - To ensure information on the employment and the procurement strategies is disclosed at all settlements within the Social AoI.
  - Initiate stakeholder engagement early on, starting during the ESIA phase, through inclusive dialogue to build a shared understanding of the potential positive and negative impacts of workers influx, and the associated risks and opportunities.
  - Continuing to engage local people in the employment opportunities and work with suppliers to enable capacity building, procurement, employment and contracting opportunities in the communities, as part of maximizing the positive benefits.
- The Community Grievance Management Procedure described in the Stakeholder Engagement Plan will be implemented to ensure that stakeholders who have concerns or complaints about the Project or wish to report their potential expectations or concerns related to local economy and employment can communicate directly with the Project.

Residual Impact Significance

Considering the adoption of the embedded controls inherent in the Project design and the proposed enhancement measures, employment opportunities will positively impact the AoI and Wilayat of Adam. Transparent hiring practices and clear information on employment opportunities will help to manage stakeholder expectations. Thus, the residual impact remains of **POSITIVE** significance.

7.6.2.3 ECONOMIC IMPACTS FROM PROCUREMENT OF GOODS AND SERVICES FOR THE PROJECT, PAYMENT OF TAXES AND FEES, AND LOCAL SPENDING

This impact refers to the potential economic benefits associated with the Project's need to purchase goods and services, from taxes paid by the Project in-country and the region as well as from worker spending, which could positively affect the local economy. The payment of taxes will generate a long-term (during entire Project lifecycle) impact. Indirect employment opportunities may be created during construction and operation in supplier industries throughout the supply chain, resulting from the Project's direct spending. These indirect jobs are separate from the direct contractors working on-site.

Sensitivity of the receptor

Receptors of this impact are businesses within the wilayat and governorate who will supply goods and /or services to the Project as well as the people whether men or women or youth in general working for them or accessing new job opportunities as a result of the Projects sourcing of the materials and services it needs.

In the context of the Wilayats of Adam, where the oil and gas sector is a source of income for small enterprises and contractors, (see Section 6.3.12), many businesses are expected to adapt well to project-driven opportunities. The unemployed population with the necessary skills, experience and availability will likely adapt readily to increased waged employment opportunities. In contrast, those lacking these attributes will be less adaptable to them and likely require some level of upskilling to benefit from new job opportunities.

Receptors are therefore considered to exhibit a **Medium** degree of sensitivity to (positive) change in indirect and induced employment opportunities.

Given the higher unemployment rates among youth and women in Oman, and their challenges in accessing waged employment compared to men, (See Section 6.3.10), these are considered vulnerable groups whose lives could significantly change if benefiting from indirect and induced waged employment opportunities and fixed incomes. Small businesses with limited experience serving the oil and gas sector will gain considerably from increased experience and capacity enhancement. It is expected that these receptors will exhibit a **High** degree of sensitivity to (positive) change in indirect and induced local employment opportunities.

This impact is considered to be **Positive** and as such, a magnitude rating is not assigned.

Construction, Operations and Decommissioning/Repowering phases

During the construction phase of the Project, a variety of materials and services will be procured to support the development. The primary raw materials required will include aggregates for the installation of the internal/peripheral roads, solar panels, and step-up substation foundations. Diesel oil will be needed to fuel heavy equipment, motor-driven machinery, and portable diesel power generators. Small quantities of lubricants may be required for heavy equipment maintenance and cleaning prior to assembly. The Project will also need waste collection, transportation, and disposal services provided by specialist contractors.

During operation, the Project will require significantly less fuel, limited to what is needed for light transport vehicles used in maintenance operations. The procurement of services will also be less frequent, covering only routine inspections, site maintenance and security, road upkeep, and waste management.

The Project's procurement of goods and services will comply with PDO's minimum requirements for spending on Omani goods and services.

The procurement of project-related components and basic services (e.g., food supply, transportation), will offer an opportunity for Omani companies to tender for work. For those companies that meet the eligibility criteria and enter the supply chain, there will be short-term benefits to the businesses —such as increased revenue— and their employees —through increased experience and training opportunities. In turn, capacity enhancement will contribute to access to resources for businesses, and the creation of long-term waged employment opportunities. These opportunities come with psychological benefits, including a stronger sense of role and status within the community, and access to broader social networks and support systems, fostering a sense of belonging and community cohesion.

Beyond these indirect economic impacts, induced economic impacts are also anticipated for businesses both within and outside the Social AoI. These impacts will arise from small and medium enterprises and local contractors providing services to the Project's direct suppliers, as well as from local and foreign off-shift workers spending a portion of their salaries in the area on food, transportation, and entertainment. This increase in business for local service providers could potentially lead to increased incomes, additional hiring, and continued investment in these local businesses, allowing for further growth.

Additionally, beyond ensuring appropriate capacity to perform work or deliver services to the Project and its contractors, any capacity-building initiatives planned to be delivered to workers and local suppliers will strengthen local workers' and entrepreneurs' skills and employability, providing employment and livelihood benefits over the longer term (as discussed above).

Non-local workers will be accommodated in the already-existing PDO accommodation camps. However, specific facilities have not been selected by the time of this assessment. Worker spending is not foreseen to be significant on the basis that services such as accommodation camps, include dining facilities (e.g., a mess hall and kitchen), medical facilities, a laundry, recreation facilities, etc. are provided. The decision on whether the same accommodation camps will be used during all phases of the Project (construction, operation and decommissioning or repowering) will be made at a later stage.

The impact of the Project and worker spending in the region is estimated to be 'positive', 'indirect', and 'induced', driven by contractor involvement and the increased demand for goods and services. These impacts are expected to be 'temporary' during construction and decommissioning/repowering period and 'long-term' during the operational period, with a 'regional' extent, affecting businesses and contractors beyond the wilayat and governorate areas.

Considering these factors, potential indirect and induced local employment and associated economic development benefits are expected to be '**Positive**', and as such, a magnitude rating is not assigned.

Impact significance

Whilst the impact magnitude is not assigned considering this is a **Positive** impact, it is still likely that the impact significance will be felt more acutely by small businesses and vulnerable groups (youth and women) who under baseline conditions do not typically engage with the industrial sector or have the same access to waged employment opportunities as do men.

TABLE 7.39 IMPACT ASSESSMENT SUMMARY: ECONOMIC IMPACTS FROM PROCUREMENT OF GOODS AND SERVICES FOR THE PROJECT AND LOCAL SPENDING DURING CONSTRUCTION AND DECOMMISSIONING/REPOWERING

Impact	**Economic impacts from procurement of goods and services for the Project and local spending during construction and decommissioning/repowering**				
Nature	Negative		Positive		Neutral
Type	Direct		Indirect		Induced
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low		Medium		High
Significance	Positive				

TABLE 7.40 IMPACT ASSESSMENT SUMMARY: ECONOMIC IMPACTS FROM PROCUREMENT OF GOODS AND SERVICES FOR THE PROJECT AND LOCAL SPENDING DURING OPERATIONS

Impact	**Economic impacts from procurement of goods and services for the Project and local spending during operations**				
Nature	Negative		Positive		Neutral
Type	Direct		Indirect		Induced
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low		Medium		High
Significance	Positive				

Enhancement Measures

Good international industry practice and operational management should be able to further enhance the potential positive local economy and employment impacts of the Project. The following enhancement measures will be implemented:

- Develop a Local Content Plan to include the following commitments:
  - The Project will agree an Employment Strategy with Primary Contractors that will include the expected level of local input for unskilled labour. Contractors will be required to attempt to source all unskilled labour from within Oman, and with best efforts to recruit unskilled labour as well as skilled labour to the extent possible from the Social AoI and the Wilayat of Adam. Agreed measures will be monitored and reported on.
  - Continue to engage local people in the employment opportunities and work with suppliers to enable capacity building, procurement, employment and contracting opportunities in the communities, as part of maximizing the positive benefits.
  - Host local supplier workshops to provide information on the tender requirements and qualifications needed.

- Identify opportunities to help local suppliers overcome gaps in their qualifications to be able to participate in tenders for project procurement.

- Monitor actual rates of local direct and indirect Project activity to measure fulfilment of local employment commitment as part of annual monitoring. If improvements in local participation levels (including employment of women) are not achieved, identify obstacles and develop appropriate additional mitigation measures. Report on results as part of regular reporting, making continuous improvement an objective.
- Implement and monitor the Grievance Management Framework and the Stakeholder Engagement Plan.

Residual Impact Significance

Considering the adoption of the embedded controls inherent in the Project design and the proposed enhancement measures, the regional Project procurement and worker spending will positively impact economies in the AoI, the Wilayats of Adam, and beyond the wilayat and governorate areas, and are expected to set a good example of economic investment in the country. Thus, the residual impact remains of **POSITIVE** significance.

7.6.2.4 IMPACTS ON TRAINING AND WORK EXPERIENCE

This impact refers to the enhanced training y work experience of workers associated with the Project.

Sensitivity of the receptor

Receptors of this impact are people accessing jobs with the Project, whether men or women or youth in general. The general population is considered to be able to access most training benefits provided through local employment and, therefore, sensitivity is considered **Low**.

More sensitive receptors are likely to be youth and women (vulnerable groups), who may also have more difficulties in accessing such opportunities compared to men, considering the traditional roles that exist in local society. It is expected that these receptors will exhibit a **Medium** degree of sensitivity to (positive) change on training and work experience.

Construction, Operations and Decommissioning/Repowering phase

During construction, the Project will employ approximately 500 people and will seek to engage locally based construction workers, where feasible (e.g. low-skilled labourers). It is likely that the Project and its contractors will seek to employ from other areas of the Wilayat of Adam and the governorate as well as from outside Oman where training and capacity building is not sufficient. The required workforce for decommissioning/repowering activities is assumed to be similar in size to that of the construction phase.

During operation, the Project will require up to 10 full-time staff (plant manager, electrical engineer, two PV technicians, cleaning robot operator, QHSE Manager, performance analist/asset manager, and an administrative role responsible for procurement, accounting and human resources) to keep the facility maintained and working. Considering the roles required to operate the Project, it is likely that very few staff requirements will translate into job opportunities for the few residents within the AoI.

Those who are able to secure employment on the Project during construction but also during operations, will likely have the opportunity to improve their skills, gain experience and thereby improve their opportunities for future employment within the construction and renewable energy sectors.

Hands-on training received while working for the Project will enable employees to develop skills, expand their experience and expertise, and empower them to access other job opportunities for future employment and/or career advancement in more senior positions. By offering job training to employees, the Project will contribute to increasing the employability and productivity of their workforce. Considering the significance of unemployment both in the Wilayat of Adam, and how much of the Project workforce is likely to be recruited locally during construction and operation, the Project is considered to contribute to increasing training levels for a small percent of this population, which nevertheless can be considered as an improvement.

The Project will have an overall 'positive' and 'direct' impact on training and work experience, and as such a magnitude rating is not assigned. Although the duration of training and work experience will be proportionate with the length of each individual's employment, the acquired skills and knowledge will elevate workers' competence and confidence and increase their employability which may significantly impact their lives in the medium to long-term.

Impact significance

Although the impact magnitude is not assessed due to it being a positive impact, it is likely that vulnerable groups, such as youth and women, will experience the impact more strongly during all Project phases. Under normal circumstances, these groups typically have less access to hands-on training and work experience in industrial sectors, particularly the renewable one, compared to men.

TABLE 7.41 IMPACT ASSESSMENT SUMMARY: IMPACTS ON TRAINING AND WORK EXPERIENCE DURING CONSTRUCTION

Impact	**Impacts on training and work experience during construction**				
Nature	Negative		Positive		Neutral
Type	Direct		Indirect		Induced
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low		Medium		High
Significance	Positive				

TABLE 7.42 IMPACT ASSESSMENT SUMMARY: IMPACTS ON TRAINING AND WORK EXPERIENCE DURING OPERATIONS

Impact	**Impacts on training and work experience during operations**				
Nature	Negative		Positive		Neutral
Type	Direct		Indirect		Induced
Magnitude	Positive	Negligible	Small	Medium	Large

Impact	**Impacts on training and work experience during operations**		
Receptor sensitivity	Low	Medium	High
Significance	Positive		

TABLE 7.43 IMPACT ASSESSMENT SUMMARY: IMPACTS ON TRAINING AND WORK EXPERIENCE DURING DECOMMISIONING

Impact	**Impacts on training and work experience during decommissioning/repowering**				
Nature	Negative		Positive		Neutral
Type	Direct		Indirect		Induced
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low		Medium		High
Significance	Positive				

Enhancement Measures

No enhancement measures are established in the local EIA. The following enhancement measures will be implemented as part of this ESIA:

The project will implement comprehensive training for all personnel, including construction and O&M staff, with specific programs for subcontractors. Key measures include:

- All workforce members, including subcontractors, will undergo induction training covering project specifics, environmental, health, safety, and social responsibilities. This includes familiarization with the applicable regulatory requirements, and internal processes for incident and emergency response.
- Ongoing toolbox talks and tailored training sessions will address specific site activities, potential environmental hazards, and key occupational health and safety topics. These sessions will also cover the importance of safe work practices, appropriate behavior, and adherence to environmental controls.
- Subcontractors must establish and deliver training programs for their teams, which will be subject to approval and audit to ensure adequacy and compliance. These programs must ensure that all personnel are trained, competent, and aware of their responsibilities.
- Training will be customized for different work areas (e.g., waste management), and will include topics such as environmental hazard avoidance, proper waste disposal, and adherence to site-specific protocols. A competent trainer will deliver engaging, audience-specific content, with regular refreshers to address changes in site conditions or activities.
- Training will include cultural awareness to prevent conflicts with local communities, promote respectful behavior, and reinforce the importance of following internal grievance procedures and worker welfare policies.
- The EPC Contractor and subcontractors to provide induction training and toolbox talks relating to the Change Find Procedure during early works and whenever deemed necessary.

- Attendance sheets for all training sessions will be maintained, recording the details of the training, facilitator, and participants to ensure accountability and track training completion.
- The training programme should cover technical matters relevant to the job to be performed, general and job-specific occupational health and safety matters, as well as policies on the expected behaviour at the workplace and when in contact with members of the community.
- Track implementation of training plan and review it according to emerging concerns related to or that might impact the Project.

Residual Impact Significance

Considering the adoption of the proposed enhancement measures, employment opportunities will positively impact the capacity and skills of people within the AoI and Wilayats of Adam who will be working for the Project. Transparent hiring practices and clear information on employment opportunities will help to manage stakeholder expectations. Thus, the residual impact remains of **POSITIVE** significance.

7.6.3 IMPACTS ON PUBLIC INFRASTRUCTURE AND SERVICES

7.6.3.1 SCOPE OF ASSESSMENT

This section assesses the following potential impacts of the Project on public infrastructure and services.

Project phase	Activity with potential impact
Construction	• Daily road transport of construction workers to and from the Project site
	• Road delivery of construction equipment, fuel and other supplies to Project site
Operation	• Road travel to the Project area by employees for inspection and maintenance, as well as the road transport of equipment or components required for maintenance or repairs.
Decommissioning	• Daily movement of decommissioning workers to and from the Project site
	• Road transport of dismantled/ decommissioned Project components and materials away from the Project site.
Repowering	Similar to Construction and Decommissioning phases

7.6.3.2 INCREASED TRAFFIC VOLUMES

This section assesses potential impacts which increased Project-related traffic volumes may generate on public infrastructure and services. An increase in Project-related traffic, particularly during construction and decommissioning/repowering activities, can generate disturbances to road access and use, congestion and delays in travel times as well as increased wear and deterioration of road surfaces.

Sensitivity of the receptors

Receptors for this impact are road users, including vehicular and pedestrian, who could be affected by increased traffic volumes. Receptors of particular relevance for this impact include

users of the road connecting the selected Port and residents near such roads. During the Project construction phase, vehicles will be transporting construction equipment and materials, by road, over a distance of approximately 332 km from the Sohar Port to the Project site (the most favorable route option to execute the material and equipment transportation is from Sohar Port, though other ports are also to be considered (*i.e.*, Duqm, Qalhat or Sultan Qaboos).

Typical vehicular road users should retain at least in some part an ability to adapt to change brought about by increased traffic volumes. No vulnerable road users[1] are expected on the unpaved roads serving oil and gas operations due to the Project's remote location. Regarding the segment of the main road within the Project's social AoI, no particularly vulnerable road users are anticipated to be present considering the AoI's sparse population and the absence of education, health, or other facilities that might attract children, the elderly, or people with physical, sensory, or mental impairments, affecting their mobility.

Therefore, the sensitivity of receptors to impacts associated with increased traffic volumes is assessed to be **Low**.

Construction phase

Mobilization of materials and equipment for the main construction phase will be an important undertaking. During the construction phase, Project-related transportation will generate periods of intense traffic movements as heavy-load vehicles will be delivering machinery, equipment and materials, and PV Plant components. The Project will be transporting materials and equipment from the Sohar Port (or other optional port) and will be mainly using articulated trucks. There will be no abnormal loads.

There is the possibility of traffic delays and blockages during movement of equipment. Such increased vehicle traffic on public roads also has the potential to lead to congestion and delays, which can further impact a receptor's access to various social infrastructure (e.g., health facilities, schools, etc.). There is also the possibility of increased wear and deterioration of public road surfaces, resulting in increased maintenance and repair needs. However, Project-related construction transportation is not a constant activity throughout the day, therefore, getting to and from the working areas will result in a temporary and localised increase in vehicles on the roads used by the Project.

Although the extent to which increased traffic volumes as a result of Project activities will persist was unknown at the of writing this report, it is considered a 'direct' 'negative' impact that will have a 'regional' physical extent. The duration of the impact will be 'temporary' (lasting 17 months). As the impact will occur only at specific times in a day when shipments are supplied to the site its frequency is considered 'intermittent'. The scale is anticipated to be 'distinguishable' given the anticipated volumes of Project materials, supplies, and/or personnel on public roads during construction. It is also anticipated that any change in typical travel behaviour by non-Project road users as a result of Project increase in traffic volumes will be common during construction. Road surfaces may experience modest deterioration, but roads

[1] Vulnerable road users are mainly those unprotected by an outside shield, namely pedestrians and two-wheelers, as they sustain a greater risk of injury in any collision against a vehicle (OECD 1998). Among vulnerable road users, some are more vulnerable than others, in particular the elderly, the disabled, and children (OECD 1998).

will continue to provide adequate passage for typical traffic, and any road upgrades by the Project will positively impact communities in the long-term.

The impact magnitude is assessed as **Medium** during construction.

Impact significance

The impact magnitude is Medium; the sensitivity of receptors is Low. Therefore, the resulting pre-mitigation significance is **Minor** for vehicular road users during construction.

TABLE 7.44 IMPACT ASSESSMENT SUMMARY: INCREASED TRAFFIC VOLUMES DURING CONSTRUCTION

Impact	**Increased traffic volumes during construction**			
Nature	Negative	Positive	Neutral	
Type	Direct	Indirect	Induced	
Duration	Temporary	Short term	Long term	Permanent
Extent	Local	Regional	National	International
Scale	Not distinguishable	Distinguishable	Evident	Major
Frequency	One-off	Intermittent	Continuous	
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low	Medium	High	
Significance	Not Significant	Minor	Moderate	Major

Mitigation/Management Measures

No relevant mitigation measures are proposed in the local EIA for this impact.

The following mitigation measures will be implemented as part of this ESIA:

- A Traffic Management Plan (TMP) will be developed in consultation with the competent authorities, traffic police and municipalities, and implemented throughout construction. The following measures will be adopted in the Project TMP:
  - Construction access roads will be clearly marked with signs for directions and speed limits, with routes, parking, and unloading areas defined in the TMP.
  - All drivers will be trained, authorized, and required to adhere to designated routes and timings. Road safety training and TMP guidelines will be provided.
  - Relevant authorities, local leaders, and communities will be informed about planned transportation routes and timings. Advance warnings will be given for road diversions and closures.
  - A mechanism will be established for local communities to file traffic and transportation complaints, with compensation for injured livestock coordinated with local authorities.

  - Deliveries will be scheduled to minimize impacts on road users, avoid vehicle queuing, and consider local conditions and stakeholder feedback.
  - The TMP will enforce speed limits across all traffic routes.

- A grievance mechanism will be established to allow local communities to make complaints relating to traffic and transportation.
- Compensation for any injured livestock will be conducted in coordination with the Wali.
- As part of a Project-related public engagement programme, regularly inform, educate, and update stakeholders and communities close to transport routes about Project traffic, especially about the safety issues and scheduling associated with movement of heavy-load vehicles on public roads.
- The Contractor will comply with all statutory vehicle limits (width, height, loading, gross weight) and any other statutory requirement. Establish and implement standards addressing the following:
  - Driver fitness standards as per the Oman Society for Petroleum Services Road Safety Standard, including mandatory rest periods and prohibition of drug/alcohol use.
  - In-vehicle monitoring systems to monitor vehicle speed and location (Project vehicles and contractors).
  - Project and contractor standards for vehicle safety and maintenance.
  - Security response for vehicle incidents.
  - Load stability standards.
- Any road damage will be repaired to an equal or better standard in a timely manner. Restore signs, streetlights and other street furniture removed for or damaged by the movement of Project-related trucks.
- The Contractor’s procedures shall specifically cover arrangements for the following important aspects:
  - The source of and number of qualified drivers required.
  - Training and approval requirements for drivers.
  - Hours of driving and rest periods.
  - Security arrangements for drivers, vehicles and loads.
  - Arrangements for driver communication with control points and vehicle equipment.
  - Language/communication issues.
  - The source of suitable vehicles (e.g. quality and specification).
  - The number of vehicles required.
  - The programme for preventative vehicle maintenance.
  - Vehicle routes, route planning and alternative routes.
  - Overall vehicle movements.
  - Procedures for the emergency recovery of vehicles.
  - Procedures for spot checks and audits of the transport system and for reporting problems.
- The contractor will be required to undertake regular inspections to ensure adherence to the TMP.

Residual Impact Significance

Effective implementation of the above mitigation measures is anticipated to counterbalance any likely increase on traffic congestion and deterioration of the road network; therefore, the residual impact significance is considered to be **Not Significant** for most users sharing the road network with the Project.

Operations phase

Traffic during operation will be limited to light transport maintenance vehicles and the movement of workers around the site. This will be significantly less than during construction as only up to 10 full-time staff will be needed for facility maintenance. The Project's operation lifetime will be of about 18 years. After this period, the Project may be repowered; PDO will evaluate the feasibility of repowering for enhanced efficiency and energy generation.

Traffic congestion and deterioration of road infrastructure are considered a 'direct' 'negative' impact that will extend 'regionally' assuming that maintenance personnel and employees will travel from few towns/villages to the Project site. The duration of the impact will be 'long term' as the maintenance activities will extent over the entire operational lifetime of the Project. Frequency is considered 'intermittent' as it will affect certain times in a day when maintenance vehicles and transport of employees occurs. The scale is anticipated to be 'not distinguishable' given the small number of full-time employees (10) and outsourced maintenance personnel (if any) which implies that maintenance vehicles and personnel transport will result in sparse movement on public roads.

The impact magnitude is assessed as **Small** during construction.

Impact significance

The impact magnitude is Small; the sensitivity is Low. Therefore, the resulting pre-mitigation significance on traffic congestion and deterioration of road infrastructure during operation is **Not Significant.**

TABLE 7.45 IMPACT ASSESSMENT SUMMARY: INCREASED TRAFFIC VOLUME DURING OPERATION

Impact	**Increased traffic volumes during operation**			
Nature	Negative	Positive	Neutral	
Type	Direct	Indirect	Induced	
Duration	Temporary	Short term	Long term	Permanent
Extent	Local	Regional	National	International
Scale	Not distinguishable	Distinguishable	Evident	Major
Frequency	One-off	Intermittent	Continuous	
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low	Medium	High	

Impact	**Increased traffic volumes during operation**			
Significance	Not Significant	Minor	Moderate	Major

Recommended Measures

Although the materiality of this impact is assessed as being Not Significant, the following management measures are recommended to be considered in alignment with best practices and Project Standards. In addition, to adhering to the Oman Society for Petroleum Services Road Safety Standard:

- Adjust the Traffic Management Plan for the operational phase and include the following requirements:
  - Adherence to the Traffic Management Plan by contractors.
  - Training and accreditation for Project drivers, including contractors.
  - Driver fitness standards, including mandatory rest periods and prohibition of drug/alcohol use.
  - Mandatory speed limits on Project roads.
  - In-vehicle monitoring systems to monitor vehicle speed and location (Project vehicles and contractors).
  - Project and contractor standards for vehicle safety and maintenance.
  - Security response for vehicle incidents.

Residual Impact Significance

Assuming effective implementation of the above mitigation measures, the residual impact significance will remain **Not Significant** during the operation phase.

Decommissioning/Repowering phase

Decommissioning will generate traffic associated with worker movements, disassembly of PV panels, and transport of materials away from the site. Overall, it is assumed that decommissioning will result in impacts similar in character and significance to those identified for the construction phase but over a shorter period (i.e. six months).

Traffic congestion and deterioration of road infrastructure are considered a 'direct' 'negative' impact that will have a 'regional' extent. The duration of the impact will be 'short term'.

Since the impact will occur only at specific times in a day when shipments are sent to the Port of Sohar (or other optional Port) or to suitable waste facilities, its frequency is considered 'intermittent'. The scale is anticipated to be 'distinguishable' as the movement of Project materials and/or personnel on public roads will be similar to that of the construction phase.

The impact magnitude is assessed as **Medium** during decommissioning.

Repowering (i.e., replacement of solar panels at the end of the design life, and potentially other project elements) will be potentially undertaken by PDO after the project is handed over to them under the BOOT model, which would extend the operational life of the project. Should PDO elect to re-power the project, it is recommended that EA is re-engaged by PDO to understand EA's requirements in terms of updating the environmental permit to the project

and to clarify the mechanism for meeting their requirements with respect to the assessment of environmental impact. Repowering phase is considered to include similar impacts on the social environment as the decommissioning phase. Therefore, the significance of its impact is considered to be the same.

Impact Significance

The impact magnitude is Medium; the sensitivity of receptors is Low. Therefore, the resulting pre-mitigation significance is **Minor** for vehicular road users during decommissioning/repowering.

TABLE 7.46 IMPACT ASSESSMENT SUMMARY: INCREASED TRAFFIC VOLUMES DURING DECOMMISSIONING/REPOWERING

Impact	**Increased traffic volumes during decommissioning/repowering**			
Nature	Negative	Positive	Neutral	
Type	Direct	Indirect	Induced	
Duration	Temporary	Short term	Long term	Permanent
Extent	Local	Regional	National	International
Scale	Not distinguishable	Distinguishable	Evident	Major
Frequency	One-off	Intermittent	Continuous	
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low	Medium	High	
Significance	Not Significant	Minor	Moderate	Major

Mitigation/Management Measures

As per sub-section 'Mitigation/Management Measures' for the construction phase.

Residual Impact Significance

Effective implementation of the mitigation measures is anticipated to counterbalance any likely increase on traffic congestion and deterioration of the road network; therefore, the residual impact significance is considered to be **Not Significant** for most users of the road network to be used by the Project.

7.6.4 IMPACTS ON COMMUNITY HEALTH AND SAFETY

7.6.4.1 SCOPE OF THE ASSESSMENT

This section assesses potential impacts to community health and safety as a result of a higher incidence of and/or community members' exposure to communicable or infectious diseases associated with Project activities.

Project phase	Activity with potential impact
Construction	Employment of personnel leading to impacts on community safety
	Vegetation clearance
Operation	Employment of personnel leading to impacts on community safety
Decommissioning/Repowering	Employment of personnel leading to impacts on community safety

7.6.4.2 IMPACTS TO COMMUNITY HEALTH FROM INCREASED INCIDENCE OF COMMUNICABLE OR INFECTIOUS DISEASES

This impact refers to the potential for increased transmission of communicable or infectious diseases within the community due to land clearing/new topographies and population shifts caused by the influx of workers from other parts of the country or from foreign countries.

Communicable or infectious diseases refers to illnesses caused by a diverse range of pathogens that can be transmitted through means such as disease vectors (e.g., mosquitos), ingestion of unsanitary food and water, and human contact.

According to literature sources, changes in habitat, including removal of existing habitats and/or new roadways into undeveloped areas has the potential to result in a risk of exposure to zoonotic disease vectors, including mosquitos, rodents, and bats.

Similarly, global industry experience presents the potential for an influx of Project workforce to introduce new illnesses into an area. Project workers may come from regions with higher rates of diseases transmitted person-to-person, such as tuberculosis, and a predominantly male workforce can also influence the incidence of sexually transmitted infections (STIs) if workers engage with high-risk groups such as commercial sex workers.

Sensitivity of the receptor

Receptors of this impact are the people potentially exposed to infectious disease due to exposure to cleared areas and interaction with incoming Project workforce. The sensitivity of the population to infectious disease risks depends on two primary factors: (1) whether rates of infectious or other common diseases are already high, indicating a population already burdened by the costs and health consequences of disease; and (2) whether health services, needed for the prevention, diagnostics, and treatment of infectious diseases, are readily available within the social AoI.

Based on the increase in the incidence of infectious diseases reported by the NCSI, baseline data suggests that communicable diseases of concern in Oman are likely to include dengue, acute hemorrhagic fever syndrome, pneumococcal invasive disease, tuberculosis, brucellosis, Crimean Congo Hemorrhagic Fever (CCHF), malaria, and HIV/AIDS. Airborne infections

represent the majority of outpatient morbidity cases related to communicable diseases at national and governorate level.

The social AoI (15km around the Project site) has a low population density, with the latest census indicating that there were only 161 residents in Abu Thaylah, 43 percent of whom were non-Omanis.

No clinics or hospitals are located in the social AoI. Such facilities, are only available in the settlements and PDO camps a little distance outside the AoI.

Access to primary healthcare services in the Social AoI is considered somewhat adequate, taking into account the low population density. The nearest Government hospital to the Project site is in Adam, 110 km to the north-west.

Ghabah, 26 km to the east of the Project site, hosts a government health center which opened in 2014, and would be the most likely facility that emergency cases would be taken to in case of an accident occurring in the AoI. PDO also operates a clinic at Qarn Alam to service the demand for healthcare, with urgent cases being referred on to the Government health service. If an accident occurred out of working hours, cases would likely be taken to the PDO clinic to be stabilized since it is operational 24 hours a day.

During engagement with PDO on 23 July 2024, it was confirmed that clinics with first responder and first aid capability are located at the PDO camp at Qarn Alam and mostly cater to the occupational health needs of PDO employees, although PDO personnel confirmed that they occasionally treat community members, particularly when public health facilities are closed. Clinics can be accessed for any emergency case regardless of the situation. PDO contractors are required to set up their own medical facilities to treat their personnel.

Considering the absence of information to assess the community's ability to adapt to the increased risk of transmission of communicable diseases, and following a precautionary approach, the sensitivity of the local population is considered **Medium**.

Additional impacts specific to vulnerable groups are limited within the social AoI (since there seems to be no children or elderly living within). However, given the potential to spread communicable diseases to the wilayat level and further, children, elderly and those with weakened immune system should be considered as vulnerable groups with respect to this impact as they may be more sensitive to any increase in the incidence of communicable and infectious diseases. These groups are considered to have a **High** sensitivity to this impact. This impact is not considered to disproportionately affect receptors based on gender.

Construction phase

The Project will employ approximately 500 people during the peak of construction activity. There is the potential for an increased risk for the transmission of communicable diseases from the incoming workforce to the communities in the Wilayat of Adam. This will be greatest during construction and decommissioning/repowering due to the larger numbers of workers involved compared to operations.

The incoming workforce —both directly employed and subcontracted— represent a risk as they may be sourced from countries/areas where the burden of communicable diseases is higher than in the small host community, or from areas where diseases novel to the local area may occur.

The primary care system available to these communities can likely diagnose many communicable diseases. However, diseases requiring specialized tests may only be diagnosed at distant hospitals, potentially leading to delayed diagnosis and further transmission.

Some interaction between the Project workforce and this small community during the 17-month construction period is possible since AoI residents might use some of the commercial services and, occasionally, the health care facilities available at the PDO camps visited by the Project workforce.

Non-local Project workers will be accommodated most probably in the already-existing PDO accommodation camps. Accommodation camps include dining, medical, laundry and recreation facilities. However, interaction with communities beyond the AoI is possible, as Project workers may choose to spend their time off in more populated areas within the Wilayats of Adam. This will depend on the transportation options available for Project workers to travel from the selected accommodation camp to more populated areas.

This impact is considered 'negative', 'indirect' and 'induced' given that transmission of communicable or infectious diseases within the community could occur as a result of the presence of directly employed workers and that of outsource personnel. The duration of the impact will be 'short-term'; the extent is 'regional' as it is expected to impact the small community within the Social AoI and has the potential to spread to the wilayat level and further. Following a precautionary approach, the scale is considered 'distinguishable' given the absence of baseline data on communicable diseases at Wilayat and AoI level, and considering that any case of transmission of novel diseases would make a noticeable difference from baseline conditions. The frequency is considered 'intermittent' because the influx of workers is expected to fluctuate, increasing and decreasing throughout the construction period.

The impact magnitude is assessed as **Medium** during construction.

Impact significance

The impact magnitude is Medium; the sensitivity of receptors is Medium for the general population and High for vulnerable groups. Therefore, the resulting pre-mitigation significance is **Moderate to Major** for those potentially exposed to infectious disease due to the interaction with incoming Project workforce during construction.

TABLE 7.47 IMPACT ASSESSMENT SUMMARY: INCREASED INCIDENCE OF COMMUNICABLE OR INFECTIOUS DISEASES DURING CONSTRUCTION

Impact	**Impacts to community health from increased incidence of communicable or infectious diseases during construction**			
Nature	Negative	Positive	Neutral	
Type	Direct	Indirect	Induced	
Duration	Temporary	Short term	Long term	Permanent
Extent	Local	Regional	National	International
Scale	Not distinguishable	Distinguishable	Evident	Major
Frequency	One-off	Intermittent	Continuous	

Impact	**Impacts to community health from increased incidence of communicable or infectious diseases during construction**				
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low		Medium		High
Significance	Not Significant	Minor		Moderate	Major

Mitigation/Management Measures

The following mitigation measure was included in the local EIA, considering that no social baseline had been undertaken at the time. This measure is now considered outdated.

- Undertake a social baseline and impact assessment, develop suitable mitigation measures.

The workplace is considered an important setting for interventions for the prevention and control of infections.

Good international industry practice and operational management should be able to greatly reduce the potential impact of the Project. The following mitigation or preventive measures will be implemented:

- A Workers Management Plan will be developed, including:
  - Implementation of a Workforce Code of Conduct (CoC) committing all persons engaged by the EPC contractor, including sub-contractors and suppliers, to acceptable standards of behavior. The CoC must include sanctions for non-compliance. The CoC should be written in plain language and signed by each worker to indicate that they have:
    - received a copy of the CoC as part of their contract;
    - had the CoC explained to them as part of induction process;
    - acknowledged that adherence to this CoC is a mandatory condition of employment;
    - understood that violations of the CoC can result in serious consequences, up to and including dismissal, or referral to legal authorities.
  - Conduct pre-employment screening protocols for all workers including contractors and subcontractors which will include testing for communicable diseases of concern and vaccinations.
  - Provision of awareness training about transmission routes and methods of prevention of communicable diseases of concern as well as early symptoms of such diseases. Training will be provided during induction, and at least every two years, or more often if the WHO Pandemic Alert Scale reaches Level 4.
  - All workers will be provided with primary health care and basic first aid at the PDO camps.
  - Regular medical check-ups and centralized medical treatment for all Project workers (directly and indirectly employed) will be provided.
  - Non-omani Project workers will receive cultural sensitivity training addressing local norms and customs, including those related to gender.

- The EPC Contractor will regularly monitor interactions between the community and workers both in public spaces and in private spaces, where vulnerable people have the greatest potential for abuse, especially young women.

- The Traffic Management Plan will also include:
  - Any trucking companies employed to work on the Project will have policies around health screening of their workers in line with Project requirements;
  - Contractors and subcontractors will ensure that all truck drivers who will work on site receive the training on the worker CoC and disease awareness training; and
  - At the site perimeter, the EPC Contractor will review routes and journey plans for the truckers, including likely stopping points or rest stops. The EPC Contractor will provide details of the grievance mechanism at these locations.

- A Stakeholder Engagement will be developed and regularly updated to include the following commitment:
  - The Project Proponent will implement the community grievance mechanism to address stakeholder concerns related to the Project in a timely manner.

Residual Impact Significance

Considering effective implementation of the proposed mitigation measures, the significance of any residual impact is assessed as **Minor to Moderate**.

Operations phase

The potential increased transmission of communicable or infectious diseases may extend into operations, but this will be significantly less than during construction as only up to 10 full-time staff will be needed for facility maintenance.

This impact is considered 'negative', 'indirect' and 'induced'', given that transmission of communicable or infectious diseases within the community could occur as a result of both the presence of directly employed workers and that of outsourced personnel. The duration of the impact will be 'short- term' as most infectious diseases are treatable and typically do not result in chronic or fatal health outcomes. The extent is 'regional' as it has the potential to spread to the wilayat level and further. The scale is considered 'not distinguishable' due to the small workforce potentially contributing to this increase and to the fact that most infectious diseases are treatable with no chronic or fatal health outcomes. The frequency is considered 'intermittent,' given that the more stable relationships with operations and maintenance workers will result in a less geographically diverse workforce; however, workers from areas with higher incidences of certain communicable diseases may still join at any point during operations.

The impact magnitude is assessed as **Small** during operations.

Impact significance

The impact magnitude is Small; the sensitivity of receptors is considered Medium for the general population and High for vulnerable groups. Therefore, the resulting pre-mitigation

significance is **Minor** to **Moderate** for those potentially exposed to infectious disease due to the interaction with incoming Project workforce during operations.

TABLE 7.48 IMPACT ASSESSMENT SUMMARY: INCREASED INCIDENCE OF COMMUNICABLE OR INFECTIOUS DISEASES DURING OPERATIONS

Impact	**Impacts to community health from increased incidence of communicable or infectious diseases during operations**				
Nature	Negative	Positive	Neutral		
Type	Direct	Indirect	Induced		
Duration	Temporary	Short term	Long term	Permanent	
Extent	Local	Regional	National	International	
Scale	Not distinguishable	Distinguishable	Evident	Major	
Frequency	One-off	Intermittent	Continuous		
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low	Medium	High		
Significance	Not Significant	Minor	Moderate	Major	

Mitigation/Management Measures

- The Workers Management Plan will include the following measures applicable to the operations phase:
  - Conduct pre-employment screening protocols for operation and maintenance workers including contractors and subcontractors which will include testing for communicable diseases of concern
  - Provision of awareness training about transmission routes and methods of prevention of communicable diseases of concern as well as early symptoms of such diseases. Training will be provided during induction, and at least every two years, or more often if the WHO Pandemic Alert Scale reaches Level 4.
  - The same requirements of communication to and acknowledgment from Project workers about the Workforce CoC will be applied during the operation phase, including directly employed and subcontracted workers (see measures proposed to mitigate this risk during the construction phase).
- The community grievance mechanism will be maintained during the operation phase of the Project.

Residual Impact Significance

As per the increased transmission of communicable diseases impact, the proposed measures to mitigate direct impacts, the risk is minimized. The residual impact is considered as **Not significant** to **Minor**.

Decommissioning/Repowering phase

This impact is considered 'negative', 'indirect' and 'induced' given that transmission of communicable or infectious diseases within the community could occur as a result of the presence of directly employed workers and that of outsourced personnel. The duration of the impact will be 'temporary' (six months); the extent is 'regional' as it is expected to impact the small community within the Social AoI and has the potential to spread to the wilayat level and further. Following a precautionary approach, the scale is considered at least 'distinguishable' given that the degree of change will depend upon baseline conditions at the time of decommissioning/repowering, and considering that any case of transmission of novel diseases would make a noticeable difference from baseline conditions. The frequency is considered 'intermittent' because the influx of workers is expected to fluctuate, increasing and decreasing throughout the decommissioning/repowering period.

The impact magnitude is assessed as **Medium** during decommissioning/repowering.

Repowering (i.e., replacement of solar panels at the end of the design life, and potentially other project elements) will be potentially undertaken by PDO after the project is handed over to them under the BOOT model, which would extend the operational life of the project. Should PDO elect to re-power the project, it is recommended that EA is re-engaged by PDO to understand EA's requirements in terms of updating the environmental permit to the project and to clarify the mechanism for meeting their requirements with respect to the assessment of environmental impact.

Impact significance

The impact magnitude is Medium; the sensitivity of receptors is Medium for the general population and High for vulnerable groups. Therefore, the resulting pre-mitigation significance is **Moderate** to **Major** for those potentially exposed to infectious disease due to the interaction with incoming Project workforce during decommissioning/repowering.

TABLE 7.49 IMPACT ASSESSMENT SUMMARY: INCREASED INCIDENCE OF COMMUNICABLE OR INFECTIOUS DISEASES DURING DECOMMISSIONING/REPOWERING

Impact	**Impacts to community health from increased incidence of communicable or infectious diseases during decommissioning/repowering**				
Nature	Negative	Positive	Neutral		
Type	Direct	Indirect	Induced		
Duration	Temporary	Short term	Long term	Permanent	
Extent	Local	Regional	National	International	
Scale	Not distinguishable	Distinguishable	Evident	Major	
Frequency	One-off	Intermittent	Continuous		
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low	Medium	High		

Impact	**Impacts to community health from increased incidence of communicable or infectious diseases during decommissioning/repowering**			
Significance	Not Significant	Minor	Moderate	Major

Mitigation/Management Measures

As per sub-section 'Mitigation/Management Measures' for the construction phase.

Additional measures shall be studied prior to decommissioning/repowering based on an updated health profile of the potentially affected communities.

Residual Impact Significance

Considering the effective implementation of the proposed mitigation measures, the significance of the residual impact is considered as **Minor** to **Moderate**.

7.6.5 IMPACTS ON WORKERS' RIGHTS

This impact refers to the potential negative effects on workers' physical and psychological wellbeing due to the infringement of their labour rights, which may be caused or perpetuated by how the Project manages its workers and contractors.

Absence of or insufficient contractual safeguards and controls to prevent issues such as long working hours, insufficient rest time, shortcomings in payment of living/fair wages, wrongful termination, restricted ability to exercise freedom of association, and discrimination, can result in workers experiencing negative effects on their physical and psychological wellbeing. Furthermore, in the event that worker health and safety (H&S) risks are not adequately understood and planned for, workers could experience an H&S incident.

Sensitivity of the receptor

Receptors of this impact are the Project's directly employed workers, and those employed by its contractors and subcontractors, whose fundamental rights at work may be at risk at any point of their association with the Project. Their sensitivity to infringement of their labour rights depends on the degree to which the existing legal and enforcement framework implements applicable international labour conventions, their access to representation, and their ability to seek and access remedy for any rights violations.

Workers of national origin who have previous experience in well-paid positions (such as engineers) within Oman are expected to have a **Low** degree of sensitivity to potential labour rights violations. This is because they are likely familiar with their rights under Omani Labour Law and have greater resources, such as information and networks, to seek and access representation.

Workers who are particularly vulnerable to the impacts on their wellbeing from rights infringements include those in precarious, low-paying, or hazardous jobs, those who frequently face discrimination in both public and professional spheres, and those with underlying health conditions. Their vulnerability may stem from factors such as, age, economic, social, or political status, health conditions, physical or mental disabilities, and whether labour legislation and inspections adequately protect their rights.

Based on the 'Human Rights Context' outlined in the Human Rights Risk Assessment for the Project (see Appendix J), more sensitive receptors (vulnerable workers) are likely to include female workers, low-wage migrant workers, potentially self-identified LGBTQI+ workers, untrained or inexperienced workers, and workers with disabilities. Furthermore, there may be young workers below the age of 18 and under-age child workers, specially within the Project's supply chain for services like food provision and aggregate services. These groups are expected to exhibit a **Medium** to **High** degree of sensitivity to potential rights violations, with their vulnerability varying based on the combination of areas of vulnerability they may face. For instance, in a male-dominated work environment, young female workers and low-wage female migrant workers may be more sensitive than their male counterparts to issues such as wrongful termination or restrictions on their ability to exercise freedom of association.

The sensitivity level assigned to vulnerable workers—ranging from medium to high—will be used in this assessment rather than the lower sensitivity level assigned to other workers as these workers have been identified as vulnerable based on the level of protection that the existing legal framework and enforcement capacity offers to them.

Construction, Operation and Decommissioning/repowering

The Project will employ approximately 500 people during the peak of construction activity. The Project will source locally based construction workers where feasible (e.g. low-skilled labourers). For operations, the Project will require up to 10 full-time staff (plant manager, electrical engineer, two PV technicians, cleaning robot operator, QHSE Manager, performance analist/asset manager, and an administrative role responsible for procurement, accounting and human resources) to keep the facility maintained and working.

Non-local workers will be accommodated in the already-existing PDO accommodation camps. However, specific facilities have not been selected by the time of this assessment.

Given the nature of Project activities during routine construction, operation and decommissioning/repowering activities, workers face occupational health and safety (OHS) hazards. Health and safety accidents may result in multiple severe injuries to workers and could have serious and potentially irreparable consequences such as permanent disability or fatality. Workers in the solar industry face various risks, including falls from rooftops, electrocution, repetitive stress injuries, cuts, sprains, and lifting-related injuries such as strains, muscle pulls, and back injuries. Handling solar panels, which are heavy and can heat up quickly, poses additional risks of burns if proper PPE is not used. Trips and falls, especially during rooftop installations, and exposure to serious hazards like arc flashes, electric shocks, and thermal burns are also significant concerns.

Beyond the potential impacts arising from unsafe working conditions, impacts on workers' physical and psychological wellbeing may arise from the following identified risks to workers' rights in Oman:

- There is a risk that the Project, particularly contractors and subcontractors, could engage in discriminatory practices concerning employment related to individuals' sexual orientation, gender identity, or country of origin. The absence of explicit protections against discrimination based on sexual orientation and gender identity in the Labour Law underscores the gaps in legal safeguards for LGBTQI+ individuals. This could potentially leave them vulnerable to discrimination in employment and other areas. Non-Omani

workers may be subject to degrading treatment or lack of equal opportunity for promotion. They do not benefit from the same employment conditions as Omanis.

- There is a risk of instances and /or recurring issues of unpaid or delayed wages and excessive working hours without pay. This could lead to situations of indebtedness that enhance abusive relationships between the workers and their sponsor due to workers not being able to reimburse their recruitment fees or pay their sponsors on time.
- There is a risk that the Project, particularly contractors and subcontractors, could engage in different forms of gender-based violence and harassment of women. Women are under-represented in the oil and gas industry and face gender-based discrimination, sustained by an overly masculine workplace environment. Single-sex dominated workplaces or workplace cultures that tolerate inappropriate comments, jokes, or derogatory conversations can significantly contribute to the prevalence of systematic harassment.
- Although there is limited data for child labour in Oman and despite there are systems to enforce child labour laws, indications suggest that small numbers of children are involved in tasks like fishing and farming contributing to child labour. Due to the limited control that The Project Company has over the operations of companies in its supply chain, there is a risk that underage workforce is used within the Project's supply chain, particularly for activities for the food services and aggregates services. Suppliers of construction materials might inadvertently involve child labour.
- National legislation prohibits any form of compulsory or coercive work, and new labour law prohibits employers from withholding passports of migrant workers without written consent. Nevertheless, the Kafala system leaves workers vulnerable to exploitation, increasing the risk of forced labour. Expatriates account for approximately 77 percent of the workforce, with most of them coming from India, Bangladesh and Pakistan (see Appendix J). Construction is one of the sectors where migrant workers mostly work. Workers within the supply chain companies engaged by the EPC Contractor, especially those hired for tasks like catering, cleaning, and other less skilled positions, as well as suppliers of construction materials, might inadvertently involve forced labour.

The impacts on workers' physical and psychological wellbeing due to the infringement of their labour rights is considered 'negative', 'direct' and 'indirect' given that it arises from worker management practices directly employed by the Project Proponent, those of their contractors and subcontractors, and its capacity to oversee respect for labour rights in by these. The duration of the impact will be 'temporary' during construction (lasting 17 months), 'long term' during operation', and 'temporary' during decommissioning/repowering; the extent is 'local' and 'regional' as infringement of worker rights might occur in any workplace associated to Project own activities and subcontracted services, which may spread to several wilayat and governorates in Oman. Given the current lack of data to assess the baseline status of this impact, and following a precautionary approach, the scale is considered 'distinguishable'. While labour rights infringements are expected to affect only a small proportion of the total project workforce during each phase, the impact is anticipated to result in a perceptible difference from baseline conditions. Impact frequency will be 'continuous' as the Project relies on the employment of workers throughout the Project life-time and infringements may occur at any point in their association with the Project.

The impact magnitude is assessed as **Medium** during construction and decommissioning/repowering, while it is assessed as **Small** during operation.

Impact significance

During construction and decommissioning/repowering, the impact magnitude is Medium; the sensitivity of receptors is Medium to High. Thus, the resulting pre-mitigation significance is **MODERATE** to **MAJOR**.

During operation, the impact magnitude is Small; the sensitivity of receptors is Medium to High. Therefore, the resulting pre-mitigation significance is **MINOR** to **MODERATE**.

TABLE 7.50 IMPACT ASSESSMENT SUMMARY: IMPACTS ASSOCIATED TO LABOUR RIGHTS AND WORKING CONDITIONS - CONSTRUCTION

Impact	**Impacts associated to labour rights and working conditions - Construction**				
Nature	Negative	Positive	Neutral		
Type	Direct	Indirect	Induced		
Duration	Temporary	Short term	Long term	Permanent	
Extent	Local	Regional	National	International	
Scale	Not distinguishable	Distinguishable	Evident	Major	
Frequency	One-off	Intermittent	Continuous		
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low	Medium	High		
Significance	Not Significant	Minor	Moderate	Major	

TABLE 7.51 IMPACT ASSESSMENT SUMMARY: IMPACTS ASSOCIATED TO LABOUR RIGHTS AND WORKING CONDITIONS - OPERATION

Impact	**Impacts associated to labour rights and working conditions - Operation**			
Nature	Negative	Positive	Neutral	
Type	Direct	Indirect	Induced	
Duration	Temporary	Short term	Long term	Permanent
Extent	Local	Regional	National	International
Scale	Not distinguishable	Distinguishable	Evident	Major
Frequency	One-off	Intermittent	Continuous	

Impact	**Impacts associated to labour rights and working conditions - Operation**				
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low		Medium		High
Significance	Not Significant	Minor		Moderate	Major

TABLE 7.52 IMPACT ASSESSMENT SUMMARY: IMPACTS ASSOCIATED TO LABOUR RIGHTS AND WORKING CONDITIONS - DECOMMISSIONING/REPOWERING

Impact	**Impacts associated to labour rights and working conditions - Decommissioning/repowering**				
Nature	Negative		Positive		Neutral
Type	Direct		Indirect		Induced
Duration	Temporary	Short term		Long term	Permanent
Extent	Local	Regional		National	International
Scale	Not distinguishable	Distinguishable		Evident	Major
Frequency	One-off		Intermittent		Continuous
Magnitude	Positive	Negligible	Small	Medium	Large
Receptor sensitivity	Low		Medium		High
Significance	Not Significant	Minor		Moderate	Major

Mitigation/Management Measures

No mitigation measures for this impact are included in the local EIA.

Good international industry practice and operational management should be able to greatly reduce the potential impact on Project workers from labour rights' infringements. Mitigation measures that will be implemented as part of this ESIA to reduce the risk of such violations:

- The EPC contractor will be required to apply TTE/OQAE Health, Safety, Social, Security and Environmental (hereinafter referred to as HSE) requirements during all phases of the work.
- The Project will develop an Occupational Health and Safety (OHS) Plan, as part of a Health and Safety Management System (HSMS). The OHS Plan will comply with the requirements of the Ministerial Decision No. 286/2008 approving the Regulation on Occupational Safety and Health for Establishments. In line with the World Bank Environmental, Health and Safety Guidelines for Electric Power Transmission and Distribution, a Hazard Identification and Risk Assessment will be developed in order to inform the HSMS. This management system will be enforced throughout the Project and will be applicable to all Project personnel (including direct hire employees, advisors and consultants, contractors and sub-

contractor personnel). It will include aspects such as OHS competency and training, emergency preparedness, learning from events, monitoring, audit and inspection, and performance improvement. The following measures will be included:

- The occupational health and safety conditions for workers will be assessed daily and communicated to all Project workers on-site before starting work. To mitigate the risks associated with high temperatures, weather conditions will be checked the day before using meteorological reports and online sources to assess and communicate risk levels. Workers' health will be monitored, and working alone will be avoided unless absolutely necessary. Fresh water will be provided at the site, with dispensers in the camp and insulated containers in the field to keep the water cool. Sufficient shaded rest areas will be available in the site camp and around the photovoltaic plant, allowing workers to rest when needed. On high-risk days, heavy tasks will be scheduled for the cooler hours of the day. Workers will wear long sleeves and pants, and induction talks will emphasize the dangers of heat exposure, including heat stroke, with preventive measures. Campaigns promoting hydration, heat safety, and healthy eating will be conducted. Sunscreen and neck covers are recommended for additional protection. All employees will be empowered to stop any works if adequate systems to control risks are not in place.
- Verify that all potential hazards, aspects and impacts are considered in the daily assessment of occupational health and safety conditions, and whether the necessary control measures are implemented.
- Prohibition of use of incident-inducing substances (alcohol, drug or any substance which might alter worker behavior) at the Project site and any other location where the work is being performed, while driving a vehicle, and at the project accommodation facilities. Removal of any worker under the influence of such substances from the site.
- Ensure that contractor’s and subcontractors’ personnel declare the use of any medication to the health professional at the site. The use of medications that may impair performance of the work must be reported to take appropriate measures to reduce risks.
- Implement a program to provide information on incident-inducing substances and ways to prevent their addiction.
- Adapt working time of personnel to climate, environmental, social/religious and living conditions, and ensure that working hours and rotation period duration are as per national regulation.
- Ensure that contractor and subcontractors’ medical fitness systems comply with “Fitness to Work Guidance for Company and Contractor Health, HSE and HR professionals’’ (OGP / IPIECA Guideline 2011).
- Implement a surveillance program to determine medical fitness of workers, including pre-employment medical check-up specific to its job position and once a year (as a minimum) a regular approved medical check-up suitable to their work conditions and to the risks associated with their positions. Ensure the provision of medical assistance for all workers.
- Maintain procedures to ensure that contractor’s and subcontractors’ personnel are competent to perform their duties in a safe manner and in compliance with the

contractor HSE plan, and to increase this competence through appropriate training for contractor's and subcontractors' personnel.

- Implement required trainings as per local laws and regulations, OPAL training standards applicable international standards (e.g. OSHA).
- Consideration of tendering companies' OHS performance and ongoing assessment of such performance. Inclusion of contractual clauses on supplier agreements about the consequences of breaching national legal requirements, international standards, TTE/OQAE Health and Safety requirements.
- Contractors should be required to apply the same standards to their sub-contractors and suppliers.
- Workers and sub-contractors will be provided with the means to ensure compliance such as information, instruction and training, work equipment and personal protective equipment (PPE). Training includes identification of potential hazards to workers, particularly those that may be life-threatening, as well as training in preventative and protective measures, including modification, substitution, or elimination of hazardous conditions or substances.
- Ensure the provision of adequate welfare facilities that satisfies the requirements set out in Ministerial Decision No. 286/2008 and Oman Society for Petroleum Services (OPAL) standards as a minimum requirement in the work site location.
- Workers' accommodation and temporary camps, where relevant, will be provided in line with IFC Performance Standard 2 and the guidance note on 'Workers' accommodation processes and standards' by the IFC and the European Bank for Reconstruction and Development.
- Ensure uninterrupted availability of equipment (including external defibrillators), facilities, medical emergency response, medical care, appropriate communication, appropriate communication and evacuation means for the contractor's and subcontractor's personnel. Such provisions will be established at worksites prior to the start of any mobilization of the workforce. Any appointed contractors will establish their own Emergency Prevention and Response Plan and communicate key information to the Project workforce prior to work commencing on any site.
- A formal Permit to Work (PTW) system will be developed for the facilities. The PTW will ensure that all potentially hazardous work is carried out safely and ensures effective authorization of designated work, effective communication of the work to be carried out, including hazards involved, and safe isolation procedures to be followed before commencing work. A lockout/tagout procedure for equipment will be implemented to ensure that all equipment is isolated from energy sources prior to maintenance or removal.

- A Workers Management Plan (WMP) will be developed (including workers accommodation) considering the following elements:
  - EPC Contractor, O&M Company and subcontractors to ensure alignment and adherence to local labour laws and international ILO conventions.
  - No employee or job applicant will be discriminated against on the basis of their gender, sexual orientation, gender identity, origin, age, disability, marital status, nationality, religion, affiliation to political or union organization;

- As part of their induction, all workers will be provided with sufficient and adequate information on their rights under Omani labour and social security legislation and Company Standards;
- All workers (including those of contractors and subcontractors) should enjoy working conditions that allow them to exercise freedom of association and collective bargaining;
- All workers (including those of contractors and subcontractors) will be provided with written contracts which clearly state the terms and conditions of their employment. Contracts will be verbally explained to all workers, in a language they understand, where this is necessary to ensure that workers understand their rights. Contracts must be in place prior to workers leaving their home location stipulating working hours, pay, and other terms of employment;
- Contractual agreements with contractors and suppliers will establish that the Project Proponent will monitor the effective implementation of the WMP and that it reserves the right to audit working conditions at the workplace, as well as the consequences for breaching national legal requirements, international standards, Company policies, or contractual clauses. Contractual agreements with contractors and suppliers will establish that the same standards will be applied to subcontractors.
- Supplier qualification, assessment, onboarding, and monitoring will take into consideration performance with regard to worker management, worker rights, health and safety;
- Ensure adequate oversight to comply with applicable legislation and international standards on young workers below the age of 17 and under-age child workers;
- Review and monitor the outcomes of community engagement, media coverage and its workforce and community grievance mechanism for additional indications of labour-related issues that may be arising;
- Develop a Human Resources Policy outlining the Company's approach to managing workers consistent with the requirements of IFC Performance Standard 2. Require contractors and suppliers to put in place policies in line with national legislation and international regulations; and
- The development of the Workers Management Plan should be informed by the findings and recommendations of the Human Rights Risk Assessment and considering the sensitivities of migrant and expatriate workers in Oman to better understand labour welfare and associated social risks.

- A Worker Grievance Mechanism (WGM) will be developed:
  - The Project Proponent will design and implement grievance procedures and will require the EPC contractor to implement a WGM that will be accessible to all workers, whether permanent or temporary, directly or indirectly employed.
  - The Grievance Mechanism should be:[1]
    - Legitimate: should be a clear, transparent and equitable process that is designed and implemented in accordance with the effectiveness principles, and which should encourage trust.

[1] Adapted from IPECA Worker Grievance Mechanisms: Guidance document for the oil and gas industry.

- Accessible: the procedures for using a WGM should be kept as simple as possible, avoiding unnecessary administrative stages. All workers should be informed about the grievance channels available to them, how they can be accessed, and the grievance management process.
- Predictable: management should provide a clear and known procedure for using the WGM, together with an indicative time frame for each stage of grievance management.
- Equitable: workers and management should have reasonable access to sources of information, advice and expertise necessary to engage in a grievance process on fair and informed terms. Where there are language barriers, it may be necessary to provide written materials in different languages and to engage interpreters.
- Transparent: every complaint should be treated seriously, and dealt with consistently and in an impartial, confidential and transparent manner. This builds the credibility of the mechanism among workers and ensures that it will be used.
- Rights-compatible: outcomes and remedies should be in line with internationally-recognized human rights legislation, Company Standards and national law.
- Based on engagement and dialogue with stakeholders: engaging with workers on the design and performance of a grievance mechanism can help to confirm that it meets their needs, that they will use it in practice, and that there is a shared interest in its success.

- TTE/OQAE worker grievance mechanism shall be open to contractor and subcontractor workforce in the event that the Project grievance mechanism fails to adequately resolve worker grievances. by their direct employer. TTE/OQAE will then have the authority to act to resolve this grievance.
- The Project Stakeholder Engagement Plan will be regularly updated and will include continuous engagement throughout the Project lifecycle with worker representatives and/or unions representing Project workers.

Residual Impact Significance

Application of the mitigation measures is anticipated to render the significance of the impacts associated with labour rights and working conditions as **Minor** to **Moderate** during construction and decommissioning/repowering, and as **Not Significance** to Minor during operations.

7.6.6 SOCIOECONOMIC IMPACT ASSESSMENT SUMMARY

Table 7.53 summarises the significance of the impacts assessed through Section 7.6.

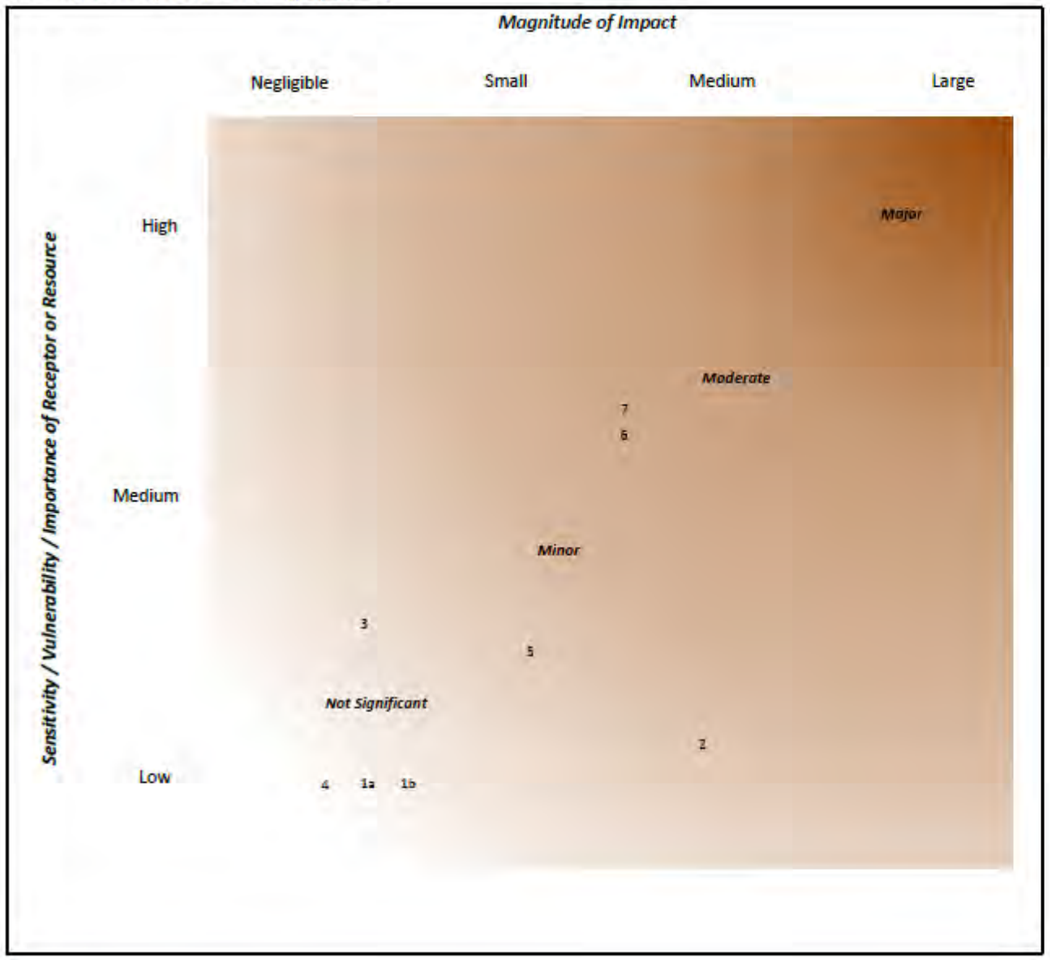
TABLE 7.53 SUMMARY OF SOCIOECONOMIC IMPACT ASSESSMENT

Impact	Project Phase	Significance	
		Pre-mitigation	**Residual**
Direct Local Employment	Construction, Operation and Decommissioning/Repowering	Positive	Positive
Economic impacts from procurement, tax payment and worker spending	Construction, Operation and Decommissioning/Repowering	Positive	Positive
Training and work experience	Construction, Operation and Decommissioning/Repowering	Positive	Positive
Increased traffic volumes	Construction and Decommissioning/Repowering	Minor	Not significant
	Operations	Not significant	Not significant
Increased incidence of communicable or infectious diseases	Construction and Decommissioning/Repowering	Moderate to Major	Minor to Moderate
	Operations	Minor to Moderate	Not significant to Minor
Impacts on workers' rights	Construction and Decommissioning/Repowering	Moderate to Major	Minor to Moderate
	Operations	Minor to Moderate	Not Significant to Minor

7.7 SUMMARY OF RESIDUAL IMPACT SIGNIFICANCE

Visual summaries of the results of the impact assessment (i.e. the significance of the potential residual impacts after mitigation and management measures have been implemented) are presented in Figure 7.7 for the construction/decommissioning/repowering phase of the Project and in Figure 7.8 for the operational phase of the Project.

FIGURE 7.7 SUMMARY OF THE SIGNIFICANCE OF IMPACTS DURING PROJECT CONSTRUCTION

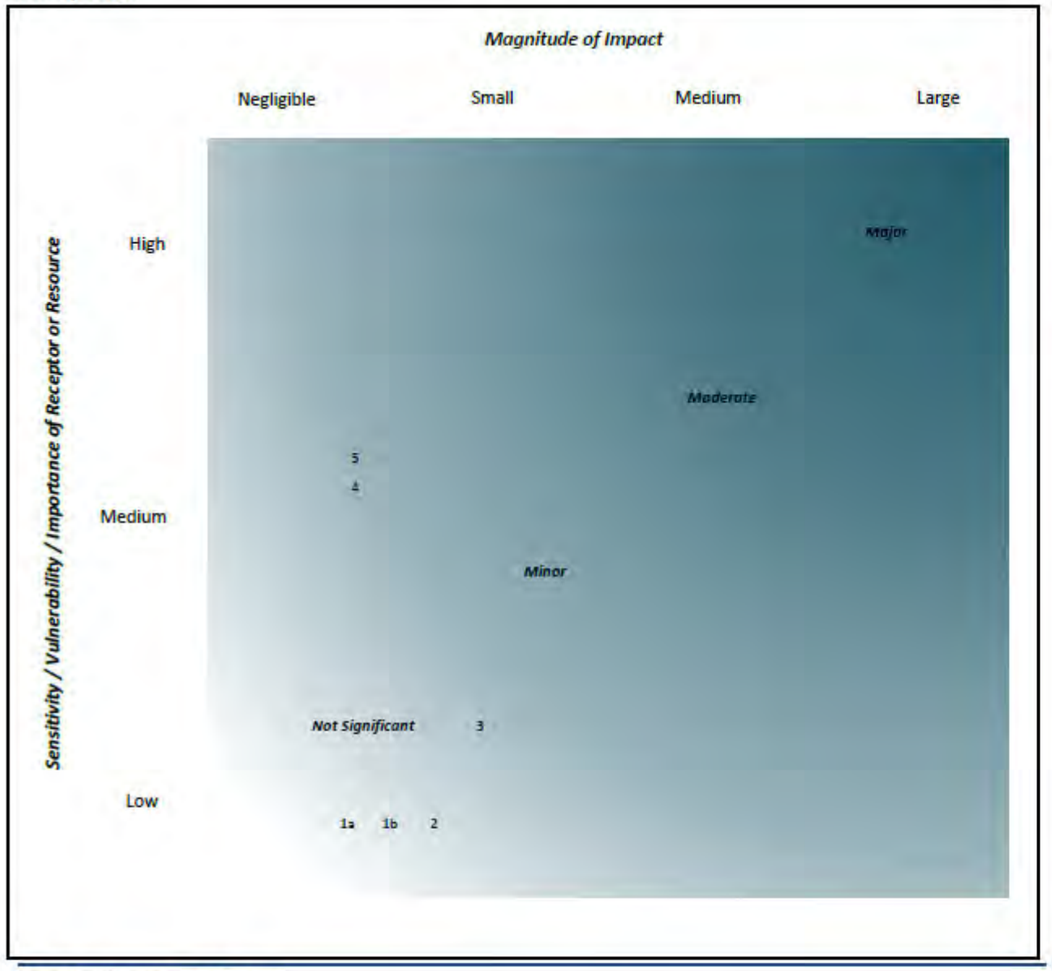


ID	Receptor	Impact
1a.	Geology and soils	Increase of soil compaction and decrease of soil quality
1b.	Geology and soils	Minor spills/leaks
2.	Surface water	Changes to drainage and surface water flows during construction
3.	Air Quality	Dust from construction activities and emissions from construction related traffic
4.	Terrestrial habitats, flora, and fauna	Site Clearance Resulting in Loss and Fragmentation of Habitats
5.	Public infrastructure and services	Increased traffic volume
6.	Community health and safety	Increased incidence of communicable or infectious diseases
7.	Labour and Working Conditions	Impacts associated to labour rights and working conditions

Note: Impacts pre-mitigation assessed in the ESIA as "not significant" have not been reported in the heatmaps.

Impact significance	Definition
Not significant	A resource/receptor (including people) will not be affected by a particular activity, or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.
Minor	A resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small (with mitigation) and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude will be well within applicable standards.
Moderate	Has an impact magnitude that is within applicable standards but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit.
Major	An accepted limit or standard may be exceeded, or large magnitude impacts occur to valued/sensitive resource/receptors.

FIGURE 7.8 SUMMARY OF THE SIGNIFICANCE OF IMPACTS DURING PROJECT OPERATION



ID	Receptor	Impact
1a.	Geology and soils	Increase of soil compaction and decrease of soil quality
1b.	Geology and soils	Minor spills/leaks
2.	Surface water and groundwater	Changes to drainage and surface water flows during operation
3	Public infrastructure and services	Increased traffic volume
4.	Community health and safety	Increased incidence of communicable or infectious diseases
5	Labour and Working Conditions	Impacts associated to labour rights and working conditions

Note: Impacts pre-mitigation assessed in the ESIA as "not significant" have not been reported in the heatmaps.

Impact significance	Definition
Not Significant	A resource/receptor (including people) will not be affected by a particular activity, or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.
Minor	A resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small (with mitigation) and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude will be well within applicable standards.
Moderate	Has an impact magnitude that is within applicable standards but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit.
Major	An accepted limit or standard may be exceeded, or large magnitude impacts occur to valued/sensitive resource/receptors

7.8 UNPLANNED EVENTS

7.8.1 LARGE/MAJOR LEAKS/SPILLS OF OIL, FUEL, CHEMICALS AND WASTES DURING PROJECT ACTIVITIES

The use of heavy machinery, hazardous materials (e.g. diesel) and production of wastes, always involves a certain level of risk. This risk is largely related to the potential occurrence of unplanned spills. The causes can vary but typically involve a combination of poor implementation of good industry practice and malfunction of tools/machinery. The most common scenarios can be summarized as follows:

- Large/Major fuel spills during transfer or during refuelling of machinery (e.g. generators, trucks, vehicles).
- Large/Major oil spills from machinery during maintenance or operation (e.g. trucks, bulldozers, cars).
- Large/Major spills or spreading of hazardous materials during transport (both raw materials and waste).
- Large/Major spills or spreading of hazardous materials due to improper on-site storage and management.
- Soil contamination from wastewater/greywater due to poor practice (e.g. design and management of soakaway).

The above scenarios have the potential to impact the physical, biological, and social environments. However, these would be localized by nature and can be managed through standard industry good practice, as well as several topic-specific management plans.

The following key management measures will be implemented through the Project's ESMMP:

- Environmental, social, health and safety (EHS) training of construction staff to minimize the occurrence of environmental impacts to the work area and prepare appropriate response (including training on EHS through EHS induction programme as well as routine training refreshers).
- The Project will prepare and implement an Emergency Response Plan (ERP) and a Pollution Prevention and Control Plan including an Oil Spill Contingency Plan (OSCP). The Project will maintain spill clean-up and response capability adequate for addressing spills for all phases of the Project. All spills will be immediately contained and cleaned up. Contaminated areas will be remediated and post remediation verification will be carried out.
- Electrical transformers containing oils must be installed on the site with adequate anti-leakage equipment (EA's Local permit condition, October 2024).
- The Project will prepare and implement a Hazardous Materials Management Plan to mitigate and manage spills of hazardous materials during all phases of the Project.
- Oil will be stored at designated areas with secondary containment.
- Refuelling of equipment and vehicles will be carried out in designated areas on hard standing ground to prevent seepage of any spillages to ground. Collection systems will be installed in these areas to manage any spills, fuels will be collected and either reused, treated by incineration, or removed by a local contractor. Drip trays must be used when refuelling and servicing vehicles or equipment, where it is not on a hard standing surface.

- Hazardous material storage will be on hard standing and impermeable surface and the bulk storage facility will be bunded. The Project will restrict storage and handling of hazardous materials and fuels to bunded areas of sufficient capacity to contain a release. Storage containers will be regularly checked and maintained.

7.8.1.1 IMPACT ON SOIL AND HYDROLOGY

The most common scenarios of accidental leaks or spills are described in section 7.8.1. The Project site soils are likely to be free draining due to their sandy/gravelly nature. Impacts would be localized by nature and can be managed through standard industry good practice, as well as several topic-specific management plans. The severity is considered **Minor,** as the pollution would be with very limited environmental impact. Likelihood of occurrence is considered **Likely** as it could occur several times during plant lifetime**.**

Groundwater at the Project site is deep (more than 15.00 m bgl) and highly unlikely to be at risk from contamination from unplanned spills and leaks.

Due to the absence of permanent water bodies in the project area, the impact on hydrology is unlikely. However, if the event were to coincide with rainfall, the main wadi running SE of the project could be affected.

The implementation of recommended mitigation measures will further reduce this risk. The overall risk from spills for soil and hydrology is considered to be an **Acceptable Risk**.

7.8.2 INCREASED RISK OF ACCIDENTS AND INJURIES RELATED TO PROJECT ROAD TRAFFIC

In the event of road-related accidents impacts on road users could manifest in health effects ranging from minor physical injury to serious injury and/or loss of life. During the construction, operation and decommissioning/repowering phases, Project traffic generated by the movement of equipment, materials and workers could have the negative impact of increasing risks for traffic accidents on the roads surrounding the Project site.

Key factors that can contribute to an increased risk of a traffic accident include general road and other environmental conditions (e.g., pavement, signage, weather, sidewalks/road shoulders, and mixed traffic [e.g., pedestrians]), as well as behaviour and enforcement (e.g., speed limits, passing under conditions of limited visibility, not driving while under the influence of alcohol). Factors that increase the chance of an adverse health outcome in the event of an accident include access to adequate emergency medical response.

Project-related transportation will generate periods of intense traffic movements as heavy-load vehicles will be delivering machinery, equipment and materials, and PV Plant components. The Project will be transporting materials and equipment from the Sohar Port (or other optional port) and will be mainly using articulated trucks. There will be no abnormal loads.

The duration of traffic increases is temporary during the construction period and the impact is maintained on regional roads. The scale of the health impact is considered ‘distinguishable’ because studies (Retallack et al. 2020) show that there is a positive correlation between traffic volumes and accident frequency, indicating that changes in traffic congestion on Project roads would generate an increase in traffic-related accidents if not properly mitigated. In this context, the likelihood that locals will encounter traffic increases is considered ‘likely’. The severity is considered ‘Serious’ as the event can lead to permanent disability or fatality.

The following measures are recommended to reduce the risk of these events:

- A Traffic Management Plan (TMP) will be developed in consultation with the competent authorities, traffic police and municipalities, and implemented throughout construction.
- Monitor grievances received related to Project road traffic and capture feedback on this topic from stakeholder engagement meetings.
- Track incidence and severity of traffic accidents associated with Project road traffic.

Application of the mitigation measures is anticipated to counterbalance any likely increase on the risk of road accidents; after mitigation, the overall risk of accidents and injuries related to Project road traffic is considered to be an **Acceptable Risk**.

7.8.3 NATURAL HAZARDS / EVENTS

In the event of damage to a module due to a natural event (e.g. hail, lightning strike…) the scale of consequence to the physical and biological environment will be incidental but could be severe to any people in proximity to the solar plant (i.e. a fatality), if Project structures were to fail.

Reduction of potential hazards from natural events is best accomplished during the design phase when the structural design, layout and site modifications can be adapted. The following have been considered and incorporated as appropriate into the planning, siting, and design phases of the Project:

- Proactively designing a hail-resilient system to be hardened to hail;
- Proactively designing a lighting-resilient system to reduce negative consequences (e.g. fires);
- Facilities, buildings, plants, and structures are located to minimize potential risks from forces of nature (e.g. floods); and
- All Project structures are designed in accordance with engineering and design criteria mandated by site-specific risks, including but not limited to seismic activity, slope stability, wind loading, and other dynamic loads.

Therefore, the severity is considered **Minor,** as the natural events would be with very limited impact due to the lack of receptors in the area. The likelihood of natural hazards/events is considered **Unlikely.** The overall risk of the project in combination with natural hazards/events is considered to be an **Acceptable Risk**.

7.8.4 MALFUNCTION OF PROJECT COMPONENTS

Aside than the physical PV faults occurrence, driven by natural hazards, PV systems may also encounter intrinsic electrical faults. According to the PV system's electrical network distribution, electrical faults can occur as ground, line to line, line to ground, arc, and power conditioning units' faults causing:

- Risk of operator electrocution and voltage instability; and
- Risk of equipment burning and wire damage.

However, the project will be designed according to the best available international practices and following Total's internal H&S standards, so the likelihood of these events can be considered **Unlikely**. Severity is considered very serious due to possible fatalities and environmental damage from an extended fire. Therefore, the overall risk of the project in combination with natural hazards/events is considered to be an **ALARP**.

The implementation of the following plan will further reduce the likehood of malfunction of project components and/or the negative consequences of these:

- Workers Management Plan
- Occupational Health and Safety Management Plan
- Community Health and Safety Management Plan
- Emergency Response Plan

7.8.5 AVIATION INCIDENT WITH SOLAR PV FARM

According to S. Sreenath et al. (2020) there are seven types of possible hazards from airport-based solar PV systems including glare occurrence and interference to communication systems. They recommend engineers to work along aviation and airport officials to mitigate possible risks from solar PV installation in the airports.

However, TTE Project is located more than 10 km from the nearest airport, so the risks studied are considerably reduced. It should be noted that the Project Proponent has obtained a No Objection Certificate (NOC) from the Civil Aviation Authority (CAA) for the development and operation of this Project.

Therefore, an incident involving aviation traffic is considered **Unlikely** to occur. Considering a **Very Serious** severity for fatalities due to impact by blade/fragment, the overall risk is considered **ALARP**.

As a mitigation measure, fluid communication with CAA, aviation and airport officials to mitigate possible risks from solar PV installation in the vicinity of the airport.

7.8.6 UNPLANNED EVENTS IMPACTS SUMMARY

TABLE 7.54 UNPLANNED EVENTS IMPACTS SUMMARY

Impact	Significance (including inherent and design mitigation and management)
	Human receptors
Large/Major Leaks/Spills Of Oil, Fuel, Chemicals And Wastes During Project Activities	**Acceptable Risk**
Increased Risk Of Accidents And Injuries Related To Project Road Traffic	**Acceptable Risk**
Natural Hazards/Events	**Acceptable Risk**
Malfunction of Project Components	**Moderate Risk - ALARP**

Aviation Incident with a Solar Farm	**Moderate Risk - ALARP**

7.9 CUMULATIVE IMPACTS

7.9.1 INTRODUCTION

The aim of this section is to present the results of the Rapid Cumulative Impact Assessment (RCIA). As explained in Section 7.2.8, the objective of a RCIA is to determine a) if the execution of the Project has the potential to contribute significantly to the cumulative impacts on Valued Environmental and social Components (VECs), and 2) if the viability of the Project may be at risk from cumulative effects on the VEC it depends on.

The main steps carried out for the analysis are:

- Identifying other existing, planned and future Projects that could cause cumulative effects;
- Identifying the VECs that could be cumulatively impacted;
- Evaluating the cumulative impacts on the VECs; and
- Develop a framework for the management of cumulative impacts.

This assessment follows the approach outlined by the IFC Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets (overall approach is summarized in Section 7.2.8)[8].

This assessment is focused on potential cumulative effects on VECs adversely impacted by significant Project impacts only (i.e., Minor, Moderate or Major) as part of the preceding assessment. Other VECs have been scoped out from this assessment on the grounds that the Project will not significantly contribute to any cumulative effects.

The information review involved desk review of available information, including existing ESIAs, and on-line public information, with corresponding and agreed site visit and stakeholder consultation. Thus, the scope of the assessment takes into account the typical limitations that a Project developer may face in this type of evaluation, including:

- Uncertainty associated with other currently operating or anticipated developments
- Lack of detailed VEC baseline information in relation to other developments;
- No third party / stakeholder inputs into the CIA process;
- Incomplete information about other Projects and activities (for example, if the information is not available in the public domain);
- Lack of provincial strategic plans, or integrated resource planning schemes.

[8] There is no fundamental conceptual difference between a RCIA and a CIA; the first is a simplified version of the second. The preliminary screening exercise resulting from a RCIA may evolve into a CIA. The only difference in practice is that typically an RCIA involves only a desk review of available information, including existing ESIAs; strategic, regional, and/or resource planning documents; and reports from nongovernmental organizations (NGOs), the scientific community, and other interested actors. A CIA is likely to involve a complex governance structure and consultation with several parties and stakeholders to determine the VECs to assess, the baseline data requirements and sampling methodology, acceptable future conditions of VECs, indicators and thresholds, mitigation measures, monitoring protocols, and supervision mechanisms.

7.9.2 APPLICATION OF THE RCIA METHODOLOGY

7.9.2.1 SCOPING PHASE 1: IDENTIFY VECS, SPATIAL AND TEMPORAL BOUNDARIES

The spatial extent of any cumulative impacts will be confined to the direct and indirect area of influence of the Project (See Figure 6.1 Physical Environment AoI).

The temporal scope of any cumulative impacts will be the same temporal scope covered by the Project and its three phases. As the most significant impacts from the Project will occur during the operation phase, this will also be the period when the potential for significant cumulative impacts is highest.

VECs are environmental and social components valued by beneficiaries and considered as the final recipients of cumulative impacts. To be included in this assessment, it must first be demonstrated that at least one stakeholder values an environmental and social component, be it a national, regional or local group, national or international scientific community, etc.

VECs are environmental and social attributes that are considered important in assessing risks; they may be:

- Physical features, habitats, wildlife populations (e.g., biodiversity).
- Ecosystem services (e.g., natural fish production)
- Natural processes (e.g., water and nutrient cycles, microclimate).
- Social conditions (e.g., health, economics); or
- Cultural aspects (e.g., traditional spiritual ceremonies).

While VEC's may be directly or indirectly affected by the Project, the cumulative effects of several other Projects often also affect them. VEC's are the ultimate recipient of impacts because they tend to be at the end of ecological pathways. Thus, the VEC's must be affected by both the Project and a combination of other Projects. If any VEC were affected by the Project, but not by the Other Projects or vice versa, the VEC would not be included.

This identification has been done using both the technical identification and approach in the different sections of this ESIA (physical-biological, socio-economic, cultural heritage and ecosystem services) giving priority to those VECs that are likely to be at the greatest risk from the development's contribution to cumulative impacts. On the other hand, the results of the baseline stakeholder engagement meetings carried out in have been taken into account, which mainly highlighted concerns arising from cumulative impacts relating to biodiversity.

The receptors and resources affected by significant adverse impacts from the Project were assessed to determine if they are considered to be a VEC. Table 7.55 sets out this evaluation.

TABLE 7.55 IDENTIFICATION OF VECS

Environmental / Social Variable	VEC?
Air Emissions	No It is anticipated that all impacts related to dust from the construction and decommissioning/repowering phases and impacts from traffic related to all phases of the project will be negligible to minor and as such no additional cumulative impacts on VECs would occur.
Climate change	No Based on the nature and scale of this renewable energy project, annual estimate of greenhouse gas (GHG) emissions (Scope 1+2) over the lifetime of the Project is expected to be less than the EP4 threshold value of significance of 100,000 tonnes of carbon dioxide equivalent (tCO2e) per year. Likewise, since the energy generated by the Project will avoid emissions that would otherwise be generated wholly or partly from more carbon-intensive higher GHG emitting sources and since it is a renewable energy generation project, whose operation phase emissions are considered to displace emissions that will otherwise be sourced from other electricity generation technologies, no cumulative impacts are expected to occur. The Project is, in fact, considered to have a positive impact on climate change.
Noise	No While the proposed further industrialization of the area would result in an incremental increase in the noise background levels, there are no close communities or receptors in the area. Noise impact is therefore not considered to be an important aspect of the cumulative impact assessment.
Soils	No As explained in Chapter 4, the Off-taker (PDO) defined the final location and area of the Project site plot. The Project will be built on reclaimed land, created for the sole purpose of industrial development (PDO's Block 6 concession area). The transmission line (under PDO responsibility) is outside of the reclaimed area and the soil at the level of their corridor routes have been extensively disturbed and modified by the installation of existing industrial pipelines. The Project does not require any take of existing land, land acquisition or any change to existing land use in adjacent areas; all project activities will be carried out within the Project boundaries. Appropriate hazardous materials and waste management as well as wastewater management and disposal will be carried out, in line with the Waste Management Plan. Soils are not considered to be an important aspect of the cumulative impact assessment.
Water Resources – groundwater and surface water	No There are no permanent water bodies in the project area. The Project will not draw on groundwater resources or surface water resources. Water will be transported to site from known and secured sources via water tankers. Groundwater abstraction to supply water is not considered as part of the Project activities at this stage. Appropriate hazardous materials and waste management as well as wastewater management and disposal will be carried out, in line with the Waste Management Plan. Water resources are therefore not considered to be an important aspect of the cumulative impact assessment.
Landscape and Visual	No While the proposed further industrialization of the area would result in an incremental increase in the visual impact, there are no close communities and few likely receptors are accustomed to the industrial development of the PDO concession area. The visual impact of the development is therefore not considered to be an important aspect of the cumulative impact assessment.

Environmental / Social Variable	VEC?
Terrestrial Ecology and Habitats	**Yes – habitats, bird collision risk and ecosystem services** The loss of habitats in the development footprint, albeit having low sensitivity, contributes to the overall loss of habitat that has occurred in the project area as a result of oil and gas development. This incrementally reduces the habitat complexity of the project AOI by a small amount with cumulative consequences on the ecology of the area, including birds and mammals (the latter being protected under RD 114/2001). The addition of project specific elements in the landscape that represent a collision risk to birds is not significant on their own, but when considered in the context of the rapid increase in the network of OHL nationally (including the Connection Project that will connect the Main Interconnected System of Northern Oman, with the Dhofar Power System, which will pass through Saih Nihaydah close to the project area) as well as the expansion of medium and low voltage distribution networks in the project AOI to serve oil and gas production activities the same pattern emerges. Low and Medium voltage lines also represent a more significant bird electrocution risk than OHLs. Continual, very small introduction of ecological risk that at the project scale is insignificant, but cumulatively these risks can potentially emerge as a major driver of bird biodiversity loss, particularly for threatened and endangered species. Few, if any, mechanisms (e.g. Strategic Environmental Assessment) in Oman are well established enough to assess cumulative impacts to address such issues, which develop without mitigation measures or policy controls at the national scale. The same cumulative, incremental process applies to grazing in the area, an ecosystem service that the development area contributes to a very small degree. Although not significant when seen in isolation, the cumulative conversion of desert rangeland to industrialised land uses erodes the resource base on which traditional livelihoods of the local community depends, which has the potential to cause slowly worsening economic challenges and hardship unless the transition to alternative income generation is actively managed.
Local economy and employment	No – social conditions (economics) During the risk and impact identification process, no other planned or clearly defined developments were identified that would enhance the positive impacts on local employment, training, work experience, or the local economy. Economic impacts from existing PDO projects are considered part of the baseline conditions, as they predate the Project.
Community Health and Safety	No – social conditions (health) During the risk and impact identification process, no other planned or clearly defined developments were identified that would exacerbate the potential increase in communicable diseases within the local communities.
Unmet expectations and benefits	No – social conditions Although some Project stakeholders anticipate various benefits from the Project (including local employment opportunities, contributions to schools, and the establishment of sustainable community initiatives), no other planned or clearly defined developments were identified that would raise similar expectations.
Social Infrastructure and services	No – social conditions During the risk and impact identification process, no other planned or clearly defined developments were identified that would contribute to an increase in traffic volumes in the area. Existing traffic levels are considered part of the baseline conditions

Following this review, the RCIA will focus of the following VECs:

- Terrestrial Ecology and Habitats: habitats, bird-collision risk and ecosystem services

7.9.2.2 SCOPING PHASE 2: IDENTIFY OTHER ACTIVITIES AND ENVIRONMENTAL DRIVERS

The Project is located within PDO's Block 6 concession area and close to PDO's Saih Nihaydah gas depletion compression facility at approximately 4 km whose purpose is to maintain reservoir pressure in the wells that make up the field. The nearest well is approximately 700 m away from the Project site. The closest airport (Qarn Alam) is located approximately 11 km south of the Project site; this airport is owned and operated by PDO. It should be noted that the Project Proponent has obtained a No Objection Certificate (NOC) from the Civil Aviation Authority (CAA) for the development and operation of this Project.

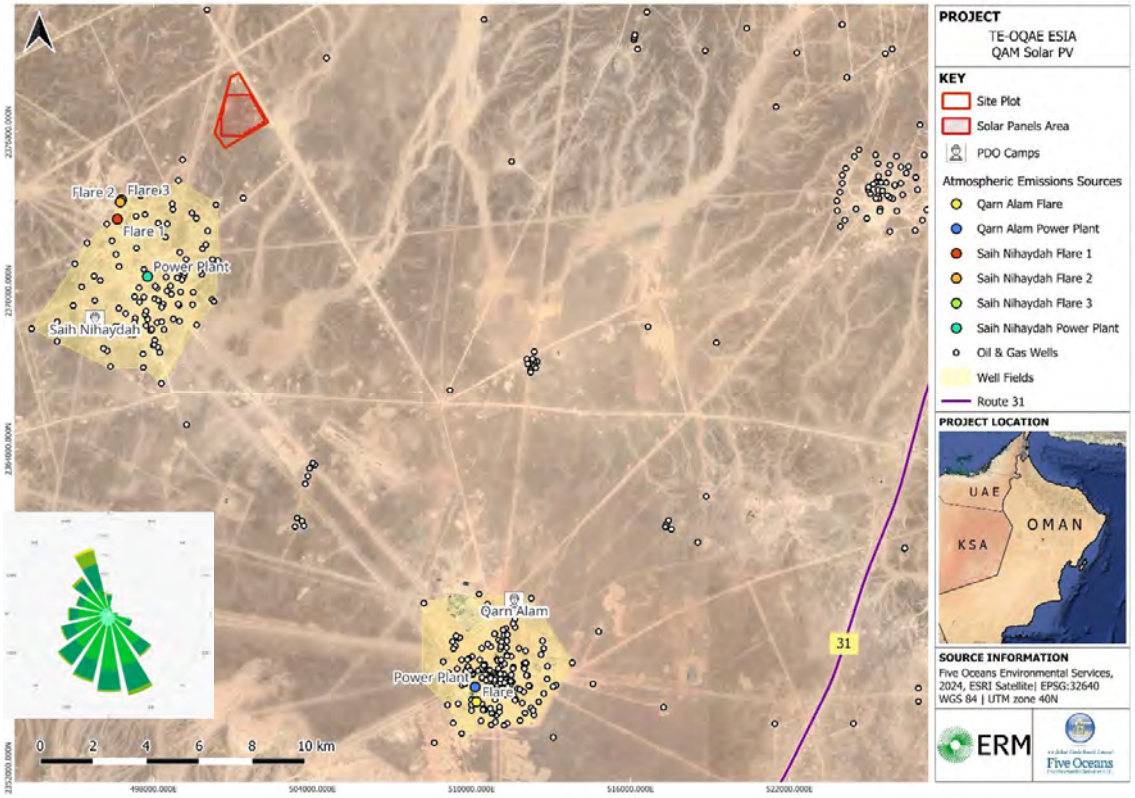
Oman Electrical Transmission Company, a subsidiary of the Nama group, is currently delivering Phase 1 of the connection project which will connect the MIS to the Dhofar Power System, the alignment of which passes through Saih Nihaydah in the Project AoI.

Other potential (but uncertain) future projects may include future Oil & Gas projects promoted by PDO, as well as other projects (including further development of renewable projects in the area).

The long term climate change hazards considered relevant to the Project and surroundings (both acute and chronic) include extreme hot temperatures and flooding (extreme rainfall), extreme winds (tropical cyclones) and sandstorms.

The developments described above in this section have been included in the cumulative impact assessment based on available information. It is expected that these planned and future projects will overlap in time and in space with the Project (mostly during the operation phase of the Project). OHTL, considered as an associated facility to the Project, is planned to be constructed in a different plot outside Project area, connecting the Project with SNDC substation substation. The exact route that will follow the OHTL is unknown at this stage of the Project.

FIGURE 7.9 OIL AND GAS FACILICTIES AROUND THE PROJECT AREA AND QARN ALAM WIND ROSE



Source: 5OES, 2024.

7.9.2.3 ASSESS CUMULATIVE IMPACT ON VECS AND EVALUATE THEIR SIGNIFICANCE

The aim of these steps in the assessment process is to describe the impact on resources and receptors and determine the potential significance of a cumulative impact, taking into account the magnitude of the potential change and the sensitivity/ vulnerability of the receptor to such changes in the context of past, present, and future actions, and to identify trade-offs. As part of the ESIA, the baseline conditions of resources and receptors that have the potential to be affected by cumulative impacts has been established (Section 4, 5 and 6). This included the collection of primary and secondary data to determine the existing conditions and the vulnerability/ sensitivity of the receptor.

Being limited by the information available in the public domain and the information generated by existing environmental and social studies, the cumulative impact assessment is presented as a qualitative and descriptive exercise.

- **Major Priority**: it is necessary to take action in the short term to mitigate the adverse cumulative effects, considered of greater significance, which are currently occurring on the VEC and that the Project would contribute,
- **Medium Priority**: action is required in the medium term to mitigate the potential adverse cumulative effects that could occur on the VEC and,
- **Minor Priority**: no action is required, since the expected cumulative adverse effects on the VEC are considered less significant.

Terrestrial ecology and habitats (including protected species)

The Project site, existing and planned developments are/will largely be located in PDO's Block 6. Such cumulative impacts include: collision and electrocution risk, and invasive species risk. The key sources of such impacts are the OHL connecting the facility with the off-taker's substation.

Bird species observed in the Project area are not considered threatened (i.e., they are of 'least concern' IUCN, 2020). Since the area is already moderately industrialized because of oil and gas developments, it is considered that bird behaviour is already habituated to some extent to existing developments and have adapted accordingly. However, this effect does not apply to migratory birds and rare visitors to the site (such as large raptors) that are encountering the site and its surroundings for the first time. Mitigation measures include the establishment of a bird monitoring program in coordination with PDO and other industries (such as developers of electrical transmission and distribution systems) with potential negative impacts on birds and other biodiversity resources. Should the Project observe unexpected bird mortality it should consider initiating a strategic assessment of cumulative ecological impacts associated with the transition to renewable energy with other developers in this sector.

One aspect, invasive species risk, is taken into consideration to assess the cumulative impact and risk of the Project with respect to terrestrial ecology and habitats, whereas the project's contribution to the cumulative bird electrocution risk is considered negligible for the reasons given below.

Cumulative Bird Electrocution Risk

Bird electrocution risk is greatest for low and medium voltage distribution lines, and the risk associated with 132 kV OHLs has been assessed as being not significant, which is also the case for both the PDO transmission system and for the Phase 1 Connection Project being planned and delivered by Oman Electricity Transmission Company which will pass through Saih

Nihaydah. Cumulative bird electrocution risk is therefore no considered further in the cumulative impact assessment since the project's contribution to the risk is negligible. However, it should be noted electricity distribution infrastructure serving the oil fields in the AOI of the project are largely low and medium circuits and probably represent a material bird electrocution risk in the area.

Invasive Species Risk

The increase vehicle movements will incrementally increase the risk of introducing invasive tree species, amongst other pest species. The two most likely pathways for this to occur are transport of materials to site and vehicle movements from areas that have already been colonised by invasive plants.

All materials and vehicles being brought to site should be inspected for seed pods of target species to minimize the risk, and monitoring of seedlings and saplings should identify young plants before they reach reproductive age. Nevertheless, currently there are no effective measures being implemented in Oman to control the spread of invasive tree species at the national or Governorate scale, although large scale eradication/ control plans have been executed on the coastal plains of Al Batinah and Dhofar, demonstrating that infestation by *Prosopis juliflora*, for example, is an area of concern and action by the Government of Oman. Logically, the investment into preventative mechanisms is far more cost-effective than repeatedly implementing large scale control programs.

The invasive species risk is considered to be low, since there are project specific mitigation measures to control risk (see Section 7.5.7.6 for details), but there are potentially root causes (e.g., soft landscaping that include invasive species, e.g., *Prosopis juliflora* at PDO contractor camps) and residual cumulative risk that needs to be addressed, pending confirmation of arrangements for and location of the NOS contractor's camp. Recommended mitigation measures have been proposed in Section 7.5.7.6 and include the development of a ESMMPto include an Alien Invasive Species Management Procedure in which it is recommended that the project proponent engages with PDO to carry out a risk assessment of invasive species risk at the PDO camps, if they are to be used for the project, and based on the results, act with PDO on any recommendations arising.

This cumulative impact from invasive species risk is considered of **low priority**.

7.9.2.4 CUMULATIVE IMPACT MANAGEMENT FRAMEWORK

The effective management of cumulative impacts requires a stakeholder consultation and a collaboration of all parties that contribute to these cumulative impacts. In many cases, a minor impact of a Project can result in a significant cumulative impact on a VEC. Consequently, the effective management of negative cumulative impacts transcends the capacity of a single interested party and therefore a management on two fronts is recommended:

- Apply a hierarchical mitigation methodology of the environmental and social impacts management generated by different Projects on the VEC (ecological or human): Avoid, Minimize, Compensate, and offset.
- Engage with other developers in the vicinity to address shared concerns. Ensure that cumulative impacts are discussed during these engagements. Where cumulative impacts are clearly identified, develop a Cumulative Impact Strategy, since cumulative impacts cannot be managed at a single Project level.

- The management of cumulative effects is the shared responsibility of various proponents and actors. The proponent of a Project can take actions to minimize the contribution of its individual effects to cumulative effects. If individual actions are not sufficient to mitigate cumulative impacts, collaborative efforts are required (IFC, 2013).
- Ideally, cumulative impact management should be led by government entities that have direct influence on proponents, in order to identify the contributions of each actor and establish the mechanism to handle the cumulative effects. International best practice establishes that individual proponents should mitigate the effects generated by their Project and, at a minimum, support and influence cumulative effects management strategies (IFC, 2013).
- According to the evaluation, the VECs with negative cumulative impacts are habitats, bird collision risk and ecosystem services.

7.9.3 TRANSBOUNDARY IMPACTS

The transboundary impacts of the Project are those that extend or occur across the national boundary (impacts that affect countries other than the country in which the Project will be constructed or operated). Project is located far away from Omani boundaries, so only impacts on Global Economy are expected.

7.9.3.1 ECONOMY

During the construction phase, the Project will entail the purchase of equipment and other goods and services, generating business for suppliers. The mobilisation activities will consist of heavy equipment transportation, mainly through existing transportation routes, while raw materials will be sourced locally, where possible. Some Project components, packages and containers will be imported by sea to and then transferred to the relevant site locations via trucks. The economic benefits will therefore primarily occur at the regional and national levels, and so, no significant transboundary impact on the economy is considered internationally.

8. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING FRAMEWORK

8.1 INTRODUCTION

This chapter presents the Environmental and Social Management and Monitoring (ESMM) framework of the North Oman Solar PV. The ESMM provides a reference point and scope for the development of detailed Project's Environmental and Social Management and Monitoring Plan (ESMMP). The ESMMP will be further developed and implemented by TTE/AOQE to manage environmental and social risks associated with the construction, operations and decommissioning/repowering of the Project.

The ESMM framework has been developed to demonstrate how the Project intends to fulfil the requirements presented in the IFC PS 1, Assessment and Management of Environmental and Social Risks and Impacts.

In addition to the requirements of PS 1, the ESMM framework content has taken into account the required management, mitigation and monitoring measures as identified in the ESIA, the IFC General Environmental, Health, and Safety Guidelines, and other relevant IFC Performance Standards.

Finally, TTE will construct the Project in line with their Corporate Environmental Policy and relevant Group Rules (GRs) / corporate EHS requirements. The policy and a selection of TTE's EHS requirements which will be implemented for the Project and integrated with the Project-specific ESMMP are presented in section 8.2.

8.1.1 PURPOSE

As mentioned above, the ESMM framework, and subsequent ESMMP, provides the structure to enable environmental and social (including community health and safety) risks to be identified and assessed throughout construction and operation, and mitigation measures to be developed, implemented and appropriately managed. The ESMM framework will therefore assist TTE/OAQE to comply with relevant authorizations, legal requirements, and International Project Standards in a systematic and structured way.

8.1.2 SCOPE

The ESMMP will be developed specifically for the Project based on this ESMM framework in a subsequent phase of the project. The ESMMP will cover all activities conducted by or on behalf of TTE/OAQE on the Project site. There will be one Construction ESMMP and one Operations ESMMP. The ESMMP will provide for the management of significant environmental and social risks, incorporating the community, as well as the health and safety of the Project personnel, contractors and visitors. A number of specific management plans will be developed in conjunction with the main ESMMP, as detailed in section 8.5.

The ESMMP will cover all biodiversity-related measures, incluiding Alien Invasive Species Management Procedure and no net loss measures if applicable to comply with IFC PS6.

The requirements and commitments set out in this document are directly applicable to all Project personnel, including TTE employees (full-time, part-time, temporary and seconded staff etc.). The EPC and other contractors and suppliers are required to implement management

systems complying with the minimum standards set out by the Project Framework ESMMP, as communicated in this document.

The ESMM is intended to address all aspects of "sustainability", as addressed in the IFC Performance Standards. As such, it encompasses consideration of environment, social, occupational health and safety, and labour and working conditions. For the sake of simplicity, the acronym E&S is used throughout this document, but this acronym should be interpreted as including environmental aspects as well as social performance aspects (i.e. community relations, community health safety and security, labour and working conditions).

This ESMM is focused on the project components only, acknowledging that the risks that may arise from its Associated Facilities are considered and discussed in a separate ESIA and its associated ESMP.

8.1.3 PROJECT STANDARDS

The Project Standards governing the ESMMP are included in Section 2 and Appendix D of the ESIA, and include:

- All relevant national regulatory requirements including: national policy, legislation and regulations, local development plans, relevant international treaties and agreements to which Oman is signatory;
- All Project-specific permits conditions or directions from regulatory authorities, including Permit conditions issued by the Environmental Authority (EA) in October 2024 as a result of the local ESIA A approval;
- TTE's corporate requirements;
- International Lender's Environmental & Social Requirements (International Finance Corporation & Equator Principles).

8.1.4 MANAGEMENT OF CHANGE

Some gaps and uncertainties mainly in project design inevitably remain in terms of information regarding the proposed Project at the time of completing this report. Changes in the Project may also occur due to unanticipated situations and adaptive changes may occur during the course of the project life cycle.

TTE/OQAE will implement a clear and transparent management of change procedure, in order to identify these gaps and uncertainties and to take them into account when they arise. The objective of the procedure is to ensure that the impact of changes is identified and assessed prior to changes being implemented.

The management of change procedure will ensure that:

- Proposed changes have a sound technical, safety, environmental, and commercial justification;
- Changes are reviewed by competent personnel and the impact of changes is reflected in documentation, including operating procedures;
- Hazards resulting from changes that alter the conditions assessed in the ESIA have been identified and assessed and the impact(s) of changes do not adversely affect the management of health, safety or the environment;
- Changes are communicated to personnel who are provided with the necessary skills, via training, to effectively implement changes;

- The appropriate responsible person accepts the responsibility for the change; and
- The Environmental Authority (EA) is updated on any material changes to the project plan.

Design Change Management Procedure can be found in Appendix K of this ESIA.

8.2 TTE E&P HSE MANAGEMENT SYSTEM

TTE E&P has a health, safety and environment management system (HSE MS) in place that contributes to controlling the HSE risks of its activities. It encompasses the organisational structure; planning activities; responsibilities; and practices, processes, procedures and resources utilised in maintaining conformance with the project's HSE policy derived from TotalEnergies HSE charter (see Figure 8.1) and achieving continuous HSE performance improvement.

FIGURE 8.1 TOTALENERGIES HEALTH, SAFETY AND ENVIRONMENT POLICY

Safety health environment quality charter

In accordance with its Code of Conduct, TotalEnergies has adopted the following principles concerning safety, security, health, the environment, quality and societal commitment:

1. TotalEnergies holds safety, security, health, respect for the environment, customer satisfaction, listening to all stakeholders by way of an open dialogue, as paramount priorities.
2. TotalEnergies complies with all applicable laws and regulations wherever it conducts its business and supplements them with specific requirements and commitments when necessary.
3. TotalEnergies promotes, among its employees a shared culture which the core components are professionalism, the rigorous compliance and application of regulations, skills management, incident feedback and continuous learning. This approach relies on the vigilance and commitment of all.
4. Each and every team member, at all levels, must be aware of their role and personal responsibility in the practice of their duties. Individuals must demonstrate the strictest discipline in preventing accidents and deliberate damage; in protecting health, the environment and product and service quality whilst addressing stakeholder expectations. Rigor and exemplarity in these fields are important criteria in evaluating the performance of each member of personnel, in particular for those in positions of responsibility.
5. TotalEnergies favors the selection of industrial and business partners on the basis of their ability to apply policies similar to its own concerning safety, security, health, the environment, quality and societal measures.
6. TotalEnergies implements, for all of its operations, appropriate management policies regarding safety, security, health, the environment, quality, societal commitment and a periodic risk assessment of relevant policies and measures. Any development of a project or launch of a product is undertaken upon full lifecycle risk assessment.
7. Appropriate safety, health, environmental, quality and societal commitment management systems for each business undergo regular assessment involving measurement of performance setting milestones, formulating relevant action plans and instituting suitable control procedures.
8. TotalEnergies implements incident response plans and means of intervention designed to face different types of events it may encounter. Such measures are periodically updated and reviewed during exercises.
9. TotalEnergies is committed to managing its energy consumption, emissions in natural environments (water, air and soils), production of final waste, use of natural resources and impact on biodiversity. It develops new processes, products and customer services in order to enhance energy efficiency and reduce environmental footprint.
10. TotalEnergies adopts a constructive attitude towards safety, security, health, the environment and quality, based on transparency and an open dialogue with stakeholders and outside parties. Through its societal commitment, TotalEnergies is particularly keen on contributing to the sustainable development of neighboring communities, with a focus on human, economic and social issues. It conducts its operations in such a way as to responsibly ensure security, in compliance with the Voluntary Principles on Security and Human Rights (VPSHR).

Patrick Pouyanné
Chairman and Chief Executive Officer

TotalEnergies

September 2021

The TTE E&P HSE MS is composed of 10 Common Principles, transposed into 55 Expectations and further elaborated into HSE specific rules.

The Common Principles are as follows:

- Principle 01 – Management, Leadership, Communication and Engagement
- Principle 02 – Compliance with Laws, Regulations and Group Requirements
- Principle 03 – Risk Management
- Principle 04 – Operations, Reliability and Efficiency
- Principle 05 – Contractors and Suppliers
- Principle 06 – Competence and Training
- Principle 07 – Emergency Preparedness
- Principle 08 – Incident & Accident Management and Information Sharing
- Principle 09 – Monitoring, Audit and Inspection
- Principle 10 – Performance Improvement.

The Common Principles are organised in line with the plan–do–check–act improvement cycle as shown in Figure 8.2.

FIGURE 8.2 ORGANISATION OF THE COMMON PRINCIPLES IN THE PLAN–DO–CHECK–ACT IMPROVEMENT CYCLE

In general terms, TTE's HSE MS comprises a set of components that includes the following:

- HSE policy;
- HSE objectives;
- planning of activities to attain the HSE goals;
- identification of the risks involved in TTE's activities;
- the organisation within which the HSE responsibilities are clearly defined;
- competent, trained personnel;
- internal and external communication;
- practices and processes formally defined in controlled documentation;
- the emergency response system;
- evaluation of HSE performances and regular review of those performances;
- corrective action plans;
- an internal control programme; and
- Periodic management reviews of the action plans.

The application of these components for the TTE/OQAE North Oman Solar PV will be further detailed in the following sections.

8.3 RESOURCES, ROLES AND RESPONSIBILITIES

TTE and OQAE is committed to provide resources essential to the implementation and control of the ESMMP. Resources include the appropriate human resources and specialised skills. As a contractual requirement, the EPC contractors are required to provide sufficient resources to manage the HSE aspects of their work. This includes providing adequate resources to monitor compliance of their subcontractors and suppliers.

TTE and OQAE are the Project Proponents and is ultimately responsible for the management and supervision of all project activities. TTE and OQAE have an HSE department which has responsibility for both HSE and Social Performance with dedicated staff, competent on the basis of appropriate education (i.e. education that enables staff to fulfil their contractual job description), training and experience.

The TTE HSE Guidelines and Protocols assign responsibilities to all personnel throughout the Company and requires contractors to manage HSE in line with the Guidelines and Protocols. Following is a summary of key responsibilities.

The **General Manager** has overall responsibility for HSE and is thus responsible for assuring that the ESMMP is developed and implemented in line with TTE requirements via the provision of adequate resources. He/she will be assisted by its HSE Manager.

Managers are responsible for:

- Managing resources in an effective manner to achieve TTE's HSE Guidelines and Protocols & strategic HSE objectives.
- Develop, implement, monitor and maintain functional processes and procedures to ensure best practice within own area of responsibility.

Supervisors are responsible for:

- Through their own actions and behaviour, and workplace presence, show visual leadership and commitment to the health and safety of employees, protection of the environment and the avoidance of loss.
- Ensure that safety, health and environmental considerations are taken into account when work tasks that come under their areas of responsibility, are being planned and carried out. This includes ensuring that all significant safety and environmental aspects are adequately managed in accordance with the HSE Risk Register, Standards and Operational Procedures of the Company.
- Follow-up implementation of measures within their areas of responsibility.

All **TTE/OQAE personnel & contractors** are responsible for:

- The application of the Project'S HSE MS.
- The quality of their own work, and the safety and impact of their actions. Individuals shall report incidents and are encouraged to propose improvements. An individual, who finds that the work cannot continue without danger to life or health, shall take the required action to stop the work.

The TTE/OQAE HSE department is headquartered in Muscat, where staff overseeing commissioning and operations will be located. Staff will also be located in Sohar to facilitate HSE and social performance oversight of site activities as well as to allow direct interface and access for stakeholders. These functions will manage the successful implementation of the Project ESMMP and the continuation of the stakeholder engagement process.

Supervision of contractor activities will be conducted by the relevant TTE/OQAE technical team. This will be accomplished through management controls over strategic project aspects and interaction with contractor staff where project activities take place. The TTE/OQAE technical team will ensure that their contractors comply with relevant legislation and standards as indicated in Section 8.1.3.

Individual responsibilities and accountabilities will be defined through position descriptions and conditions of employment contracts. Environmental and social responsibilities will also be written into the service agreements of TTE/OQAE.

8.4 COMMITMENTS REGISTER

The impact assessment along with identifying potential impacts arising from the different project phases on environmental, social and health components, outlined mitigation and management measures to be upheld on the Project, and the monitoring/reporting recommendations to demonstrate effective mitigation for E&S aspects. A consolidated summary of all required mitigation, management and enhancement measures proposed in this ESIA is provided in Table 8.1. These mitigation measures will be integrated into the main ESMMP or associated management plans for their adequate implementation and follow-up.

During negotiation of the EPC contract, a number of the commitments set out in Table 8.1 will be cascaded to the EPC, who will lead day-to-day operations within the site fence, and associated EHS performance and delivery of related Project commitments. This will be done by including these in all EPC contracts as an appendix with signed duty to comply.

Table 8.1 will continue to evolve and develop, with further periodic reviews and updates, as the Project progresses, to take into account and record any additional commitments made by the Project, or measures which have been closed out and implemented.

Table 8.1 summarises potential impacts and related mitigation measures identified for the construction, operation and decommissioning/repowering phases (including unplanned events and cumulative impacts) of the Project, the type of commitment and the associated management plan.

TABLE 8.1 SUMMARY OF POTENTIAL IMPACTS AND RELATED MITIGATION MEASURES

TTE/OQ's NORTH OMAN SOLAR PV PROJECT Note: C: Construction / O: Operation. Construction commitments are similar to those for Decommissioning/Repowering (where applicable).

COMMITMENT REGISTER

ID	ESIA Section Reference	Project Phase	Associated project impact	Receptors	Type of Commitment	Specific Commitment/Action	Responsible Party for Implementation	Associated Management /Monitoring Plan	Performance Monitoring *(proposed timing and frequency - subject to construction and operation activities and contractor management plans)*	Controls *(proposed controls - subject to construction and operation activities and contractor management plans)*
1	7.5.1	C	Soil compaction and decrease of soil quality	Geology & soils	Mitigation	The CEMMP will include measures related to erosion control	EPC contractor	EMMP	Monthly and prior to rain events	Inspection reports
2	7.5.1	C	Soil compaction and decrease of soil quality	Geology & soils	Mitigation	All construction equipment and workers will be restricted to the construction site footprint and temporary laydown area. Adjacent storage and activity outside of these areas will require authorisation by PDO.	EPC contractor	EMMP, WMP, TMP	One off and applicable to entire construction duration	Inspection reports
3	7.5.1	C	Soil compaction and decrease of soil quality	Geology & soils	Mitigation	Infill material will be preferentially sourced from within the Project site.	EPC contractor	EMMP	Prior start of relevant construction activity	Inspection reports
4	7.5.1	C	Soil compaction and decrease of soil quality	Geology & soils	Mitigation	Temporary stockpiles of excess excavated material will be stored in areas to avoid interruption of surface drainage.	EPC contractor	EMMP	One off. To be monitored monthly at least	Inspection reports
5	7.5.1	C	Soil compaction and decrease of soil quality	Geology & soils	Mitigation	All excavated material will be considered for re-use in coordination with PDO.	EPC contractor	EMMP, WMP	One off and applicable to entire construction duration	Decision statements, Inspection reports
6	7.5.1	C	Soil compaction and decrease of soil quality	Geology & soils	Mitigation	Excavated holes and trenches will be infilled in a timely manner (i.e. in line with the agreed work schedule) to minimise potential for erosion and disruption to potential surface flows.	EPC contractor	EMMP	During excavation works, timing to be tailored to the volume and activity	Inspection reports
7	7.5.1	C	Soil compaction and decrease of soil quality	Geology & soils	Mitigation	Should there be a need to store excess material on site, it will be stockpiled separately in order to avoid the mixing of soil types and facilitate subsequent soil replacement and site restoration. This measure must be implemented in coordination with other measures after a feasibility analysis by the TTE technical team. According to the Bureau de Recherches Géologiques et Minières, there is only one soil type in the area (Gypsiorthids). However, if during the works another soil type is found in the area, this measure would come into action.	EPC contractor	EMMP	When storing excess material on site.	Inspection reports

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8	7.5.1	C	Soil compaction and decrease of soil quality	Geology & soils	Mitigation	Vehicle traffic and earthmoving equipment will be restricted to designated roads, tracks, and laydown areas. These will be detailed in the Traffic Management Plan. For speed limitations, see mitigation measures in Sections 7.5.3 and 7.5.4.	EPC contractor	TMP	One off and updated regularly and as required	Inspection reports TMP in place
9	7.5.1	C	Soil compaction and decrease of soil quality	Geology & soils	Mitigation	All workshops and equipment laydown areas containing hazardous substances (e.g. fuel) must be appropriately bunded and contain spill kits. This will be detailed in the Hazardous Materials Management Plan and Pollution Prevention & Control Plan.	EPC contractor	HMMP, PPCMP	One off and updated regularly and as required	Inspection reports
10	7.5.1	C	Soil compaction and decrease of soil quality	Geology & soils	Mitigation	Designated workers on site will be trained in handling, clean-up and disposal of solid and liquid wastes, including notification and record keeping of such incidents.	EPC contractor	WMP, WWMP	Refer to training requirements: onboarding and training refreshers	Training materials Training attendance records
11	7.5.1	C, O	Soil compaction and decrease of soil quality	Geology & soils	Mitigation	A Water and Wastewater Management Plan shall be prepared for the construction and operational phases of the project to adequately manage effluents. A copy of this plan shall be held on site, and approved by the concerned stakeholders.	EPC contractor (2 years)/Developer	WWMP	One off and updated regularly and as required	Approved plan in place Inspection reports
12	7.5.1	C, O	Soil compaction and decrease of soil quality	Geology & soils	Mitigation	A Pollution Prevention and Control Plan shall be put in place to minimize spills arising from on-re-fuelling and replacement of hydraulic fluid, lube oil and oil filters. This plan will also identify where hazardous materials and wastes are stored on site, spill prevention measures to be implemented, training requirements, appropriate spill response actions for each material or waste, the locations of spill response kits on site, a procedure for ensuring that the spill response kits are always adequately stocked, and procedures for making timely notifications to authorities.	EPC contractor (2 years)/Developer	PPCP	One off and updated regularly and as required	Approved plan in place Training materials Training attendance records Inspection reports

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13	7.5.1	C, O	Soil compaction and decrease of soil quality	Geology & soils	Mitigation	A Waste Management Plan shall be prepared for the construction and operational phases of the project. A copy of this plan shall be held on site, and approved by the concerned stakeholders. - All waste will be segregated and managed in accordance with the waste hierarchy and the availability of corresponding facilities for recycling or other management options for segregated materials. - All domestic waste to be appropriately stored in covered skips and disposed of regularly (not less than monthly) using a government approved waste transport contractor to the most appropriate licensed waste disposal facility. - All hazardous wastes shall be segregated and appropriately stored and disposed of regularly (not less than monthly) using a government approved waste transporter to the licensed waste storage facility at Qarn Alam or for disposal a the hazardous waste facility at Sohar (Beah). - Disposal consignment notes (detailing disposal method, date, volumes, and type) must be obtained and kept for all waste disposal.	EPC contractor (2 years)/Developer	WMP	One off and updated regularly and as required	Approved plan in place Inspection reports
14	7.5.1	C	Soil compaction and decrease of soil quality	Geology & soils	Mitigation	A documented inventory of all hazardous substances (with supporting Material Safety Data Sheets) used and temporarily stored will be maintained and available on site at all times as per the Hazardous Materials Management Plan.	EPC contractor	HMMP	One off and reviewed/checked annually	Approved plan with MSDS available in place Inspection reports
15	7.5.1	C	Soil compaction and decrease of soil quality	Geology & soils	Mitigation	A copy of the Construction Environmental Management and Monitoring Plan and or the EPC Environmental, Safety and Health (ESH) Management Plan will be available on site.	EPC contractor	CEMMP	One off and reviewed/checked annually	Approved plan in place Inspection reports
16	7.5.1	C	Soil compaction and decrease of soil quality	Geology & soils	Mitigation	During construction works, a designated focal point will be stationed on site during work hours to co-ordinate any public interaction (e.g. queries, feedback and complaints). Immediate neighbours to the work area will be notified at the start and end of construction activities. Immediate neighbours will be advised on how to use the Grievance Mechanism before construction begins.	EPC contractor	Grievance Mechanism	Throughout the construction phase	Notification records Grievance mechanism in place Grievance log

ID	ESIA Section Reference	Project Phase	Associated project impact	Receptors	Type of Commitment	Specific Commitment/Action	Responsible Party for Implementation	Associated Management /Monitoring Plan	Performance Monitoring *(proposed timing and frequency - subject to construction and operation activities and contractor management plans)*	Controls *(proposed controls - subject to construction and operation activities and contractor management plans)*
17	7.5.1	O	Localised soil contamination	Geology & soils	Mitigation	On-site monitoring and quantification of airborne contaminants and their accumulation in washwater (transboundary contamination depositing on the PV panels) will be routinely conducted over the operational period and the results shared with EA.	EPC contractor (2 years)/Developer	EMMP	Monitored regularly	Monitoring reports Lab results Communication records with EA
18	7.5.1	C, O	Localised soil contamination	Geology & soils	Mitigation	Soil from areas where there are potential sources of contamination such as substations and diesel generators, as well as other potential sources of contamination shall be covered with reinforced concrete, in order to prevent the seepage of contaminants into the ground (EA's Local permit condition, October 2024).	EPC contractor (2 years)/Developer	EMMP	Monitoring measure as per permit condition	Inspection reports
19	7.5.1	O	Localised soil contamination	Geology & soils	Mitigation	Hazardous wastes will be disposed of by a government approved licensed third-party contractor.	EPC contractor (2 years)/Developer	WMP, WWMP	Monitored regularly	Waste disposal certificates Waste contractor license
20	7.5.1	O	Localised soil contamination	Geology & soils	Mitigation	Hazardous substances (e.g. lubricating oils) shall be securely stored in a designated enclosed area with secondary containment within the solar site.	EPC contractor (2 years)/Developer	HMMP/PPCP	One off and monitor monthly	Inspection reports
21	7.5.1	O	Localised soil contamination	Geology & soils	Mitigation	Wastes (e.g. oily rags) will be segregated to ensure no cross contamination of non-hazardous wastes (e.g. packaging) and to ensure maximisation of potentially recyclable wastes.	EPC contractor (2 years)/Developer	WMP	One off and monitor monthly	Inspection reports
22	7.5.1	O	Localised soil contamination	Geology & soils	Mitigation	Glass and non-hazardous e-wastes (e.g. broken or faulty PV panels) will be safely disposed of in an approved landfill (Be'ah).	EPC contractor (2 years)/Developer	WMP	One off and monitor monthly	Waste disposal certificates
23	7.5.2	C	Changes to drainage and surface water flows during construction	Water resources	Mitigation	Potential soil erosion will be controlled at culvert outlets with appropriate structures. Catch basins, roadway ditches, and culverts will be cleaned and maintained regularly. This mitigation measure is subject to the hydrological study recommendations.	EPC contractor (2 years)/Developer	EMMP	One off and monitor regularly	Inspection reports
24	7.5.2	C	Changes to drainage and surface water flows during construction	Water resources	Mitigation	On-site surface runoff control features will be designed to minimize the potential for increased localized soil erosion. Drainage ditches will be constructed where necessary but held to a minimum.	EPC contractor	EMMP	One off and monitor regularly if new drainage ditches are required	Inspection reports

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25	7.5.2	C	Changes to drainage and surface water flows during construction	Water resources	Mitigation	Remaining drainage works and road construction will be done in a manner that minimizes erosion risk.	EPC contractor	EMMP	One off and monitor monthly	Inspection reports
26	7.5.2	C	Changes to drainage and surface water flows during construction	Water resources	Mitigation	Some locations where the interaction between predicted floodwater and proposed site facilities will require mitigation works to minimize flood risk: - Relocation – this will eliminate the risk of flooding by shifting the at-risk infrastructure to areas of low risk. This is the preferred option as it minimizes the cost of flood protection measures. - Protection – this will require design of flood protection measures to mitigate against flood risk. These have been specified as an alternative in the case where relocation is not feasible. Protection measures include backfill of depressions, raising of equipment and Irish type crossings.	EPC contractor	EMMP	Mitigation action - as required	Flood risk measures in place Inspection reports
27	7.5.2	C	Changes to drainage and surface water flows during construction	Water resources	Mitigation	Industrial yard and camp plot: provide perimeter bunds and drains and include internal drainage systems.	EPC contractor	EMMP	One off	Inspection reports
28	7.5.2	C	Changes to drainage and surface water flows during construction	Water resources	Mitigation	Reinstatement of the topography of temporary construction areas as far as feasible.	EPC contractor	EMMP	One off at the end of construction / reinstatement	Inspection reports
29	7.5.2	O	Changes to drainage and surface water flows during operation	Water resources	Mitigation	Catch basins, roadway ditches, and culverts will be cleaned and maintained regularly. This mitigation measure is subject to the hydrological study recommendations.	EPC contractor (2 years)/Developer	EMMP	One off and monitor regularly	Inspection reports
30	7.5.3	C	Airborne emissions caused by site preparation and works	Air quality	Mitigation	The company must control the emission of pollutants, dust, unpleasant odors, and other environmental nuisances from storage and handling areas, and adhere to environmental practices and regulations established by the Authority (EA's Local permit condition, October 2024).	EPC contractor	EMMP	Throughout construction	Inspection reports

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31	7.5.3	C	Airborne emissions caused by site preparation and works	Air quality	Mitigation	International best practice dust control measures, such as using covers when transporting or storing stock-piled materials will be followed to suppress dust emissions.	EPC contractor	EMMP	Throuhgout construction	Inspection reports
32	7.5.3	C	Airborne emissions caused by site preparation and works	Air quality	Mitigation	If required, wind breaks should be erected around the key construction activities, and, if possible, in the vicinity of potentially dusty works;	EPC contractor	EMMP	Throuhgout construction	Inspection reports
33	7.5.3	C	Airborne emissions caused by site preparation and works	Air quality	Mitigation	Use of localised dampening and activity specific dampening should be used to reduce localised emissions of dust;	EPC contractor	EMMP	Throuhgout construction	Inspection reports
34	7.5.3	C	Airborne emissions caused by site preparation and works	Air quality	Mitigation	Dust will be minimised through wet suppression of unpaved access and site roads during moderate (Beaufort 4) and higher wind speeds (Beaufort 4+) to avoid potential for adverse impact on offsite receptors e.g. traffic. Dust is recognised by OPAL as an HSE hazard for traffic using unpaved roads.	EPC contractor	EMMP	During moderate and higher wind speeds - as required	Inspection reports
35	7.5.3	C	Airborne emissions caused by site preparation and works	Air quality	Mitigation	Earthmoving or excavation works will cease in unfavourable weather conditions (i.e. strong winds - Beaufort 6+) if wind speeds pose a health and safety conditions risk due to dust generation.	EPC contractor	EMMP	Stop of activity during unfavourable weather conditions - As required	Inspection reports
36	7.5.3	C	Airborne emissions caused by site preparation and works	Air quality	Mitigation	With the exception of loading / unloading, vehicles transporting loose aggregate will be appropriately covered to avoid generation of windborne material.	EPC contractor	EMMP, TMP	As required throughout the construction	Inspection reports
37	7.5.3	C	Airborne emissions caused by site preparation and works	Air quality	Mitigation	Applicable OPAL's Road Safety Standard speed limits will be imposed on unpaved roads and a safe speed limit on site will be set by the company HSE team taking into consideration the need to minimise dust generation.	EPC contractor	TMP	Throughout the project	Road signs (where feasible) TMP in place

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38	7.5.3	C	Airborne emissions caused by site preparation and works	Air quality	Mitigation	All loaded materials transported offsite that have the potential to generate dust will have appropriate mitigation measures to control dust (i.e. covered), prior to the material leaving the site. This will be included as part of a Traffic Management Plan.	EPC contractor	TMP	As required throughout the construction	Inspection reports TMP in place
39	7.5.3	C	Airborne emissions caused by site preparation and works	Air quality	Mitigation	Hard surfaces (e.g gravels made of crushed rock) will be established on site to assist in managing dust from construction roads and entrances and to mitigate against future erosion.	EPC contractor	EMMP	As required throughout the construction	Inspection reports
40	7.5.3	C	Airborne emissions caused by site preparation and works	Air quality	Mitigation	Measures to minimise dust will be discussed at on site toolbox talks. The resident engineer, site managers, supervisors are to be made aware of dust as an environmental (and health and safety) issue, and instruct labourers accordingly.	EPC contractor	EMMP	Weekly toolbox	Toolboxes provided
41	7.5.3	C	Airborne emissions caused by site preparation and works	Air quality	Mitigation	Use of modern equipment and vehicles meeting appropriate emissions standards, and regular preventative maintenance (in line with manufacturer's recommended maintenance schedules, considering intensity of use and operating environment).	EPC contractor	EMMP	As required throughout the project	Procurement control Maintanance schedule sheet in place
42	7.5.3	C	Airborne emissions caused by site preparation and works	Air quality	Mitigation	Excavation, handling, and transport of erodible materials shall be avoided under high wind conditions where practicable. Where not feasible, transported erodible materials shall be covered.	EPC contractor	EMMP, TMP	As required throughout the construction	Inspection reports TMP in place
43	7.5.3	C	Airborne emissions caused by site preparation and works	Air quality	Mitigation	Drop heights of material when stockpiling should be minimised	EPC contractor	EMMP	As required throughout the construction	Inspection reports
44	7.5.3	C	Airborne emissions caused by site preparation and works	Air quality	Mitigation	Where stockpiles are in use, the design should be optimised to retain a low profile with no sharp changes in shape, avoiding surpassing heights that could compromise the stability of the stockpile leading to erosion or collapse, and designing slopes at angles that maintain structural integrity, often recommended between 20-30 degrees depending on the material.	EPC contractor	EMMP	As required throughout the construction	Inspection reports

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45	7.5.3	C	Airborne emissions caused by site preparation and works	Air quality	Mitigation	Where ground and earthworks are exposed, these areas should be covered as far as possible, for example with sheeting or boarding, or if necessary, the use of chemical binders investigated;	EPC contractor	EMMP	As required throughout the project	Inspection reports
46	7.5.3	C	Airborne emissions caused by site preparation and works	Air quality	Mitigation	Where ground and earthworks are covered or surface binders are used, the smallest possible area for working should be exposed;	EPC contractor	EMMP	As required throughout the construction	Inspection reports
47	7.5.3	C	Airborne emissions caused by site preparation and works	Air quality	Mitigation	Stockpiling of material, for example, topsoil and sand should be minimised;	EPC contractor	EMMP	As required throughout the construction	Inspection reports
48	7.5.3	C	Airborne emissions caused by site preparation and works	Air quality	Mitigation	Stockpiles shall be located as far away as possible from receptors;	EPC contractor	EMMP	As required throughout the construction	Inspection reports
49	7.5.4	C	Noise Impact	Ambient noise	Recommended	During construction works, a designated focal point will be stationed on site during work hours to co-ordinate any public interaction (e.g. queries, feedback and complaints).	EPC contractor	Grievance Mechanism	As required throughout the construction	Grievance mechanism in place Grievance log
50	7.5.4	C	Noise Impact	Ambient noise	Recommended	Immediate neighbours to the work area will be notified at the start and end of construction activities. Immediate neighbours will be advised on how to use the Grievance Mechanism before construction begins.	EPC contractor	SEP & Grievance mechanism	At start and end of construction	SEP & Grievance mechanism in place Notifiication records
51	7.5.4	C	Noise Impact	Ambient noise	Recommended	High noise-generating construction works and activities should be limited to the daytime period (7 AM to 10 PM), and work should be avoided on non-working days or public holidays if possible. Piling to be carried out during daylight hours only. Extension to piling outside of these hours will be risk assessed and communicated to the client and PDO for approval.	EPC contractor	EMMP	As required throughout the construction	Inspection reports

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52	7.5.4	C	Noise Impact	Ambient noise	Recommended	Where practicable, alternatives to noisy diesel and petrol engines and pneumatic units will be used, such as hydraulic or electric-controlled units.	EPC contractor	EMMP	As required throughout the construction	Procurement control Inspection reports
53	7.5.4	C	Noise Impact	Ambient noise	Recommended	Throttle settings will be reduced and equipment and plant turned off, when not being used.	EPC contractor	EMMP	As required throughout the construction	Inspection reports
54	7.5.4	C	Noise Impact	Ambient noise	Recommended	Equipment will be regularly inspected and maintained to ensure it is in good working order. The condition of mufflers will also be checked. Equipment will not be operated until it is maintained or repaired, where maintenance or repair would address the annoying character of noise identified.	EPC contractor	EMMP	As required throughout the construction	Inspection reports Maintanance schedule sheet in place
55	7.5.4	C	Noise Impact	Ambient noise	Recommended	Minimizing drop height of materials.	EPC contractor	EMMP	As required throughout the construction	Inspection reports
56	7.5.4	C	Noise Impact	Ambient noise	Recommended	Works associated with transmission line and access road construction often require activities in closer proximity to receptors that are not affected by construction works at wind turbines or permanent facilities. In these circumstances, task-specific noise mitigation and management measures should be implemented (when works are close to receptors) to reduce noise impacts to acceptable levels. As TTE stated, transmission line and access road construction is under PDO Scope. It is considered an associated facility to the project (IFC standard), but mitigation measures must be defined under their specific project ESIAs or in liaison with PDO in case no ESIA is available.	As agreed with PDO	As agreed with PDO	As agreed with PDO	As agreed with PDO
57	7.5.4	C	Noise Impact	Ambient noise	Recommended	Implementation of speed limits (50 km/h) for trucks while travelling to and from construction sites (within Buildings and on village roads of poor condition: 30 km/h).	EPC contractor	TMP	As required throughout the construction	TMP in place Road signs (where feasible)
58	7.5.4	C	Noise Impact	Ambient noise	Recommended	As part of the Traffic Management Plan, Project's heavy vehicle traffic routing through community areas should be avoided wherever possible.	EPC contractor	TMP	As required throughout the construction	TMP in place
59	7.5.4	C	Noise Impact	Ambient noise	Recommended	Limiting hours of heavy vehicles passing through community areas in case they should cross them.	EPC contractor	EMMP, TMP	As required throughout the construction	TMP in place Inspection reports
60	7.5.4	C	Noise Impact	Ambient noise	Recommended	Where practicable, earth mounds or rock piles between the construction activity and the NSRs.	EPC contractor	EMMP	As required throughout the construction	Inspection reports

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61	7.5.4	C	Noise Impact	Ambient noise	Recommended	If any validated noise complaints are received, the problem source and any potential noise-reducing measures should be identified and evaluated for implementation during the works. If the noise complaint cannot be validated, no further mitigation or management measures are required.	EPC contractor	EMMP	As required throughout the construction	Grievance mechanism in place
62	7.5.4	C	Noise Impact	Ambient noise	Recommended	Vehicles and machinery will be shut-off when not in use on the Project site.	EPC contractor	EMMP	As required throughout the construction	Inspection reports
63	7.5.5	C, O	Climate Change	Climate Change	Mitigation	The company must use appropriate means and techniques to enhance energy efficiency and reduce consumption to the maximum extent possible (EA permit condition, October 2024)	EPC contractor (2 years)/Developer	CCRMP	As required throughout the project	Procurement control
64	7.5.5	C	Extreme Heat	Climate Change	Recommended	Invest in solar panels made from materials designed to withstand higher temperatures without losing efficiency.	EPC contractor	CCRMP	One off	Procurement control
65	7.5.5	C	Extreme Heat	Climate Change	Recommended	Ensure sufficient airflow beneath panels for cooling. For example, mounting panels slightly above the surface can create a small air gap that helps dissipate heat.	EPC contractor	CCRMP	One off	Inspection reports
66	7.5.5	C	Extreme Heat	Climate Change	Recommended	Upgrading transmission infrastructure to withstand extreme weather events, such as using stronger materials to reduce vulnerability.	EPC contractor	CCRMP	One off	Inspection reports
67	7.5.5	C	Extreme Heat	Climate Change	Recommended	Implement Dynamic Line Rating (DLR) systems that optimize the use of transmission lines by adjusting power flow based on real-time conditions, such as temperature and wind speed.	EPC contractor	CCRMP	One off	Inspection reports
68	7.5.5	C, O	Extreme Heat	Climate Change	Recommended	Develop comprehensive heat emergency response plans outlining protocols for addressing heat-related emergencies and providing medical assistance if needed.	EPC contractor (2 years)/Developer	CCRMP	One off	Plan approved Inspection reports
69	7.5.5	C, O	Extreme Heat	Climate Change	Recommended	Ensure a heat stress management plan included in CCRMP covers outdoor workers and employees.	EPC contractor (2 years)/Developer	CCRMP	One off	Plan approved Inspection reports
70	7.5.5	C, O	Extreme Heat	Climate Change	Recommended	Implement mandatory rest breaks in shaded or air-conditioned areas to allow workers to cool down.	EPC contractor (2 years)/Developer	CCRMP	As required throughout the project	Mandatory rest applied
71	7.5.5	C, O	Extreme Heat	Climate Change	Recommended	Provide water and electrolyte drinks at regular intervals to prevent dehydration.	EPC contractor (2 years)/Developer	CCRMP	As required throughout the project	Water/Electrolytes Provision List
72	7.5.5	C, O	Extreme Heat	Climate Change	Recommended	Rotate worker’s shifts frequently to limit their exposure to extreme heat.	EPC contractor (2 years)/Developer	CCRMP	As required throughout the project	Rotation books

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73	7.5.5	C, O	Extreme Heat	Climate Change	Recommended	Conduct heat awareness training programs to educate employees about heat-related risks and the importance of staying hydrated.	EPC contractor (2 years)/Developer	CCRMP	As per training programme	Training materials Training attendance records
74	7.5.5	C	Flooding	Climate Change	Recommended	Where feasible, relocate infrastructure at risk of flooding to areas with lower flood risk. This option is the most advisable, as it reduces the cost of implementing flood protection measures.	EPC contractor	CCRMP	One off	Micrositing applied
75	7.5.5	C	Flooding	Climate Change	Recommended	Installing electrical components and critical infrastructure above potential flood levels to prevent water damage.	EPC contractor	CCRMP	One off	Inspection reports
76	7.5.5	C	Flooding	Climate Change	Recommended	Backfilling depressions to the natural ground level to avoid water accumulation.	EPC contractor	CCRMP	One off	Inspection reports
77	7.5.5	C	Flooding	Climate Change	Recommended	Constructing barriers or levees around the plant to prevent floodwaters from reaching critical areas.	EPC contractor	CCRMP	One off	Inspection reports
78	7.5.5	C	Flooding	Climate Change	Recommended	Effective drainage systems can help divert floodwaters from the plant, reducing the risk of damage.	EPC contractor	CCRMP	One off	Inspection reports
79	7.5.5	C	Flooding	Climate Change	Recommended	Implement low-water crossings (Irish type) to prevent site road crossings from flooding.	EPC contractor	CCRMP	One off	Inspection reports
80	7.5.5	C	Flooding	Climate Change	Recommended	Elevating substations and critical components above-expected flood levels.	EPC contractor	CCRMP	One off	Inspection reports
81	7.5.5	C, O	Flooding	Climate Change	Recommended	Conduct routine inspections and maintenance to identify vulnerabilities and ensure that protective measures are functioning properly.	EPC contractor (2 years)/Developer	CCRMP	Regular monitoring	Inspection reports Maintanance schedule sheet in place
82	7.5.5	C	Flooding	Climate Change	Recommended	Installing pumps in low-lying areas to quickly remove accumulated water.	EPC contractor	CCRMP	One off	Inspection reports
83	7.5.5	C, O	Flooding	Climate Change	Recommended	Obtain comprehensive insurance coverage that also includes flood damage to mitigate financial risks.	EPC contractor (2 years)/Developer	CCRMP	One off	Insurance/Legal control
84	7.5.5	C, O	Flooding	Climate Change	Recommended	Develop emergency response plans, outlining specific actions to be taken during flood events.	EPC contractor (2 years)/Developer	CCRMP	One off and updated as required	Plan approved
85	7.5.5	C, O	Flooding	Climate Change	Recommended	Train staff on emergency procedures and conduct regular drills to ensure readiness.	EPC contractor (2 years)/Developer	CCRMP	As per training programme	Training materials Training attendance records Post-Drill report

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86	7.5.5	C	Flooding	Climate Change	Recommended	Implement effective drainage systems to redirect water from the Site.	EPC contractor	CCRMP	One off	Inspection reports
87	7.5.5	C, O	Water Stress	Climate Change	Recommended	If water is needed for operations, consider using non-potable sources like treated wastewater or greywater to reduce the demand for local freshwater supplies.	EPC contractor (2 years)/Developer	CCRMP	As required throughout the project	Inspecition reports
88	7.5.5	C, O	Water Stress	Climate Change	Recommended	Deploy robotic cleaning systems that can operate with minimal water or use no water at all.	EPC contractor (2 years)/Developer	CCRMP	One off	Inspecion reports
89	7.5.5	C, O	Water Stress	Climate Change	Recommended	Identify alternate water sources to ensure uninterrupted water supply during periods of water stress.	EPC contractor (2 years)/Developer	CCRMP	As required throughout the project	Inspection reports
90	7.5.5	C, O	Water Stress	Climate Change	Recommended	Explore opportunities for rainwater harvesting at the site and within a wider watershed area.	EPC contractor (2 years)/Developer	CCRMP	As required throughout the project	Inspection reports
91	7.5.5	C, O	Water Stress	Climate Change	Recommended	Comply with local and national water use regulations to avoid legal issues and ensure sustainable water practices.	EPC contractor (2 years)/Developer	CCRMP	As required throughout the project	Inspection reports
92	7.5.5	O	Water Stress	Climate Change	Recommended	Develop and implement water conservation policies and practices within the solar power plant operations.	EPC contractor (2 years)/Developer	CCRMP	As required throughout the project	Policies and practices in place
93	7.5.5	C, O	Water Stress	Climate Change	Recommended	Implement systems to regularly monitor water usage to identify leaks, wastage, or inefficiencies.	EPC contractor (2 years)/Developer	CCRMP	As required throughout the project	Water metering system records
94	7.5.5	C, O	Water Stress	Climate Change	Recommended	Implement systems to recycle/reuse water for cleaning and cooling purposes.	EPC contractor (2 years)/Developer	CCRMP	As required throughout the project	Water recycle/reuse records
95	7.5.5	C, O	Water Stress	Climate Change	Recommended	Ensure workers have an ample supply of drinking water and encourage regular hydration breaks.	EPC contractor (2 years)/Developer	CCRMP	As required throughout the project	Water/Electrolytes Provision List
96	7.5.5	C, O	Water Stress	Climate Change	Recommended	Implement programs to educate workers and local communities on water conservation practices and the importance of sustainable water management.	EPC contractor (2 years)/Developer	CCRMP	As per awareness program	Training materials Training attendance records
97	7.5.5	C	Cyclones (Extreme winds and storms)	Climate Change	Recommended	Mounting structures and support systems of solar panels should be designed to withstand high wind and debris impact, i.e., using materials and engineering standards that adhere to local building codes and regulations.	EPC contractor	CCRMP	One off	Inspection reports
98	7.5.5	C, O	Cyclones (Extreme winds and storms)	Climate Change	Recommended	Develop and implement cyclone-specific emergency preparedness and response plans and establish protocols for securing equipment, evacuating personnel, and shutting down operations safely in advance.	EPC contractor (2 years)/Developer	CCRMP	As required throughout the project	Plan approved Inspection reports

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99	7.5.5	C, O	Cyclones (Extreme winds and storms)	Climate Change	Recommended	Installing power backups, i.e., battery storage and/or diesel generators, to maintain key operations during the time of power outages caused by cyclones.	EPC contractor (2 years)/Developer	CCRMP	As required throughout the project	Inspection reports
100	7.5.5	O	Cyclones (Extreme winds and storms)	Climate Change	Recommended	Stay informed about evolving weather conditions and take proactive measures regarding the potential impacts of Cyclones on solar power plant operations.	EPC contractor (2 years)/Developer	CCRMP	As required throughout the project	Weather reports Inspection reports of implemented measures
101	7.5.5	C, O	Cyclones (Extreme winds and storms)	Climate Change	Recommended	Obtain appropriate insurance for cyclone-related risks and losses and work closely with insurers to understand policy terms and conditions, coverage limits, and claim procedures.	EPC contractor (2 years)/Developer	CCRMP	As required throughout the project	Insurance/Legal control
102	7.5.5	C, O	Cyclones (Extreme winds and storms)	Climate Change	Recommended	Provide training to staff members on cyclone safety, emergency procedures, and first aid.	EPC contractor (2 years)/Developer	CCRMP	as per the training programme	Training materials Training attendance records
103	7.5.5	C, O	Cyclones (Extreme winds and storms)	Climate Change	Recommended	Ensure that there are robust, cyclone-resistant shelters on-site where workers can take shelter during a storm.	EPC contractor (2 years)/Developer	CCRMP	One off (shelters)	Inspection reports
104	7.5.5	C	Cyclones (Extreme winds and storms)	Climate Change	Recommended	Use cyclone-resistant designs for buildings and critical infrastructure to withstand high winds and flooding.	EPC contractor	CCRMP	One off	Inspection reports
105	7.5.5	C, O	Cyclones (Extreme winds and storms)	Climate Change	Recommended	Run awareness programs to inform workers about the risks of cyclones and the importance of following safety protocols.	EPC contractor (2 years)/Developer	CCRMP	As per awareness program	Training materials Training attendance records
106	7.5.6	C	Construction landscape	Landscape character	Recommended	Areas of surface disturbance should be minimized as much as possible and be within the limits established by the EPC.	EPC contractor	EMMP	As required throughout the construction	Inspection reports
107	7.5.6	C	Construction landscape	Landscape character	Recommended	Where possible locate laydown areas and construction camps in areas that are already disturbed or cleared of vegetation;	EPC contractor	EMMP	One off	Inspection reports
108	7.5.6	C	Construction landscape	Landscape character	Recommended	Maintenance of construction site – good housekeeping on site to avoid litter and minimize waste. Excess mud or debris on construction vehicles leaving the site will be removed.	EPC contractor	EMMP	As required throughout the construction	Inspection reports
109	7.5.6	C	Construction landscape	Landscape character	Recommended	Existing tracks/roads should be used for access where possible;	EPC contractor	EMMP	One off	Inspection reports

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110	7.5.6	C	Construction landscape	Landscape character	Recommended	Technical building should have a non-reflective finish and the color should be appropriate in order to merge itself as much as possible within the landscape.	EPC contractor	EMMP	One off	Inspection reports
111	7.5.6	C	Construction landscape	Landscape character	Recommended	Minimize night lighting in order to guarantee the minimum safety level. Temporary and permanent security lighting will be installed in a manner to avoid excessive light spillage offsite and to alert on intruders.	EPC contractor	EMMP	One off	Inspection reports
112	7.5.6	C	Construction landscape	Landscape character	Recommended	Boundary fencing will be designed according following ROP requirements. It will be visually unobtrusive (chain link with appropriately coloured shade cloth) with appropriate coloured shade cloth to act as a barrier for wind-blown dust and sand entering the site at ground level.	EPC contractor	EMMP	One off	Inspection reports
113	7.5.6	C	Construction landscape	Landscape character	Recommended	Mini-buses (or other bulk transport vehicles) will be encouraged to limit individual vehicles on site.	EPC contractor	EMMP, TMP	As required throughout the construction	TMP in place
114	7.5.6	C	Construction visual	Visual amenity	Recommended	No debris or waste materials will be left at the work sites, good housekeeping on site to avoid litter and minimize waste.	EPC contractor	EMMP, WMP	Regular monitoring during construction	Inspection reports
115	7.5.6	C	Construction visual	Visual amenity	Recommended	Night lighting of sites should be minimized within requirements of safety and efficiency.	EPC contractor	EMMP	One off	Inspection reports
116		C	Construction visual	Visual amenity	Recommended	Technical building should have a non-reflective finish and the color should be appropriate in order to merge itself as much as possible within the landscape.	EPC contractor	EMMP	One off	Inspection reports
117	7.5.6	C	Construction visual	Visual amenity	Recommended	Ongoing rehabilitation of cleared areas to minimize visual scarring and maintenance clearing will be kept to the absolute minimum and should not extend beyond the work area.	EPC contractor	EMMP	One off (post rehabilitation)	Inspection reports
118	7.5.7	C	Habitat loss & fragmentation	Biodiversity (habitats, flora & fauna)	Mitigation	Existing roads will be used as far as possible to reduce habitat loss. Access to work areas will be restricted to being from within the project area via defined routes (i.e. the planned internal road network), and no off-road driving or use of construction equipment outside the project boundary is permitted except when necessary to install the perimeter fencing;	EPC contractor	TMP	As required throughout the construction	Inspection reports TMP in place

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119	7.5.7	C	Habitat loss & fragmentation	Biodiversity (habitats, flora & fauna)	Mitigation	Erection of the perimeter fence should be scheduled early in the work program to exclude wildlife from entering the site during the construction period and to control access to the site by work traffic, subject to procurement plan and availability of supply;	EPC contractor	EMMP	During construction mobilisation phase and first 4 months of construction phase	Fencing schedule Inspection reports
120	7.5.7	C	Habitat loss & fragmentation	Biodiversity (habitats, flora & fauna)	Mitigation	Construction of the access road and the internal road network should also be scheduled early in the workplan to minimise disturbance.	EPC contractor	EMMP	During construction mobilisation phase and first 4 months of construction phase	Fencing schedule Inspection reports
121	7.5.7	C	Habitat loss & fragmentation	Biodiversity (habitats, flora & fauna)	Mitigation	Habitat loss will be limited to the minimum needed for safe and efficient implementation of the works, not exceeding 50 m outside the project boundary;	EPC contractor	EMMP	Throughout the construction phase	Walk over survey and engagement with resident engineer Inspection reports
122	7.5.7	C	Habitat loss & fragmentation	Biodiversity (habitats, flora & fauna)	Mitigation	Areas within the project area (krookie) that are not to be developed are to be highlighted on a map and marked as being out of bounds (i.e. no access permitted) and included in the HSE induction briefing to all contractor personnel to prevent inadvertent disturbance of these areas.	EPC contractor	EMMP	Throughout the construction phase	Walk over survey and engagement with resident engineer Inspection reports
123	7.5.7	C	Habitat loss & fragmentation	Biodiversity (habitats, flora & fauna)	Mitigation	Dust suppression methods will be used during earthworks to limit the impact of dust on vegetation in surrounding areas to limit any excessive dust accumulation to within 50 m of the project boundary, (as per section 7.5.3, measure to be included in the CEMMP);	EPC contractor	EMMP	Throughout the construction phase	Inspection reports
124	7.5.7	C	Habitat loss & fragmentation	Biodiversity (habitats, flora & fauna)	Mitigation	Sourcing fill material required for the construction of the access road and internal roads will be from existing, operational quarries or borrow pits. No new borrow pits will be opened to source fill material for the project. If new borrow pits are opened to provide material for this project, their area will be added to the habitat loss calculations on which this assessment is based (measure to be included in the CEMMP)	EPC contractor	EMMP	Throughout the construction phase	Inspection reports Delivery notes of fill materials and aggregates
125	7.5.7	C	Habitat loss & fragmentation	Biodiversity (habitats, flora & fauna)	Mitigation	The requirement for No Net Loss is subject to further study and investigation to be conducted post-ESIA to demonstrate feasibility (e.g., land ownership issues, feedback from the local community of camel grazers, PDO etc.). If Not Net Loss is feasible, design detail will be	EPC contractor	EMMP	Post ESIA, pre-construction	Approved plan (with LTA review) in place Implementation reports

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						provided to compensate for the loss of habitats on site, in compliance with IFC PS6; this will be included in the ESMMP.				
126	7.5.7	C	Habitat loss & fragmentation	Biodiversity (habitats, flora & fauna)	Mitigation	If any planting is required for landscaping of the project site this will use endemic plants that are suited to local conditions, and advice should be sought from the Oman Botanic Gardens when selecting landscaping species. Endemic plants consume less irrigation water (if any) and will contribute to the ecological function of the project area. Suitable endemic tree species for landscaping includes, but is not limited to, Vachellia species, Prosopis cineraria, Ziziphus spina-christi, Salvadoria persica, Moringa peregrina, and Tamarix arabica.	EPC contractor	EMMP	At least 4 months before the end of construciton phase, before landscaping is installed.	Landscaping plan Completion report MOM of key engagement meetings Implementation reports
127	7.5.7	C	Habitat loss & fragmentation	Biodiversity (habitats, flora & fauna)	Mitigation	Ground clearance should avoid the breeding season of ground nesting birds (February – September), i.e. if feasible, earthworks should be scheduled to commence between October – January. Deterring nesting on site before the start of the breeding season is the preferred option, as this will avoid impact to nesting birds by displacing them to surrounding areas. However, should it be unavoidable to schedule the start of ground clearance activity during the nesting period, a nesting bird survey should be conducted to identify any pre-breeding bird behaviour, and if pre-breeding behaviour is identified it is recommended that sufficient disturbance by human activity on site (e.g., installation of passive bird deterrents such as scarecrows or other visual deterrents, and active disturbance such as early construction works (e.g. marking out or driving over the site several times a day in a 4x4 vehicle).	EPC contractor	EMMP	Post ESIA, pre-construction	Construction schedule Walk over survey and engagement with resident engineer Inspection reports
128	7.5.7	C	Habitat loss & fragmentation	Biodiversity (habitats, flora & fauna)	Mitigation	The Construction Environmental Management and Monitoring Plan (CEMMP) will detail best practice measures including those listed above and others to be implemented, to reduce the risk of secondary impacts to habitats and fauna species including to control dust etc. The CEMMP should recognise the importance of areas within the plot	EPC contractor	EMMP	Post ESIA, pre-construction	Inspection reports

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						that are will be set aside (i.e., areas not developed or disturbed by construction activity).				
129	7.5.7	C	Loss of access to grazing	Biodiversity (ecosystem services)	Mitigation	The Project must be precisely delineated during the construction phase and any steps involving unnecessary occupation of areas outside the specified Project boundaries must be avoided.	EPC contractor	EMMP	Post ESIA, pre-construction	Inspection reports
130	7.5.7	C, O	Loss of access to grazing	Biodiversity (ecosystem services)	Mitigation	Post-ESIA engagement by the Community Liaison Officer appointed by the Project with the sheikh of Abu Thaylah to present the Project and its' impact on grazing access, and to verify and assess the ability of livestock owners to adapt to the restricted access to grazing areas taken by the Project. In the event that some livestock owners are not adaptable to the restriction, any necessary measures to counteract this will be developed in consultation with the sheikh, PDO, and the Wali's office	EPC contractor (2 years)/Developer	SEP	Post ESIA, pre-construction	MoM of stakeholder engagement Approved Plan Inspection reports
131	7.5.7	C, O	Loss of access to grazing	Biodiversity (ecosystem services)	Mitigation	Design into the social development interventions provided by the project to the local community that specifically provide relief to livestock owners in Abu Thaylah who are or who are perceived to be disadvantaged by the Project.	EPC contractor (2 years)/Developer	SEP	Post ESIA, pre-construction	MoM of stakeholder engagement Approved Plan Inspection reports
132	7.5.7	C, O	Loss of access to grazing	Biodiversity (ecosystem services)	Mitigation	Regular engagement with the sheikh of Abu Thaylah during the construction and operational phases to maintain good communication and track sufficiency of social development interventions for those who are potentially disadvantaged by the Project.	EPC contractor (2 years)/Developer	SEP	Every six months starting during construction mobilisation period, schedule and frequency to be reviewed at the end of construction phase	MoM of stakeholder engagement Approved Plan Inspection reports
133	7.5.7	C, O	Introduction of invasive alien and novel species	Biodiversity	Recommended	Vehicles, equipment and materials arriving on site will be visually inspected prior to departure to site and on arrival on site (as part of the delivery confirmation/consignment note system) by the contractor's HSE team for presence of invasive species, particularly seed pods of Prosopis juliflora. Regular inspections for plant AIS that may become established (see below), should also be conducted. HSE officers are to receive a briefing about AIS risk (e.g.,	EPC contractor (2 years)/Developer	EMMP	Throughout the construction phase	Vehicle inspection reports Training materials Training records

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						Prosopis juliflora seed pod identification and safe disposal etc.).				
134	7.5.7	C, O	Introduction of invasive alien and novel species	Biodiversity	Recommended	Avoidance of Prosopis juliflora and other potentially invasive plant species in the landscaping palette to be planted on site, if applicable;	EPC contractor (2 years)/Developer	EMMP	At least 4 months before the end of construciton phase, before landscaping is installed.	Landscaping plan Completion report MOM of key engagement meetings Implementation reports
135	7.5.7	C, O	Introduction of invasive alien and novel species	Biodiversity	Recommended	Food waste will be stored in sealed bins and emptied regularly to minimise scavengers and fly infestation. Similarly, pest control measures (rodents, flies and, if necessary, mosquitos) will be implemented at the site offices, and awareness materials will be provided regarding hazardous wildlife (snakes, camel spiders, scorpions). This measure will be included in the Waste Management Plan.	EPC contractor (2 years)/Developer	EMMP, WMP	Post ESIA, pre-construction	Inspection reports
136	7.5.7	C, O	Introduction of invasive alien and novel species	Biodiversity	Recommended	An invasive species management procedure will be implemented as part of the CEMMP and OEMMP, including checking of equipment prior to shipping to site and periodic monitoring for alien invasive species that may have established themselves on site. Visual inspection of the site for alien invasive every quarter throughout the construction phase, and regular inspections (annual) during the operational phase, need to be carried out.	EPC contractor (2 years)/Developer	EMMP	Post ESIA, pre-construction (plan), quarterly surveys during construction phase	Approved procedure in place Walk over survey reports Inspection reports
137	7.5.7	C, O	Degradation of habitat from leaks and spills	Biodiversity	Recommended	Oil, fuel and other construction liquids will be stored at designated areas with secondary containment of at least 110% of the storage vessel (as per Omani legislation), with adequately sized spill kits on hand for likely spill scenarios according to best practice guidelines and aligned with PDO Company standards;	EPC contractor (2 years)/Developer	EMMP, PPMP	Throughout the construction phase	Inspection reports
138	7.5.7	C, O	Degradation of habitat from leaks and spills	Biodiversity	Recommended	All refuelling will take place on hardstanding, and should re-fuelling be required for areas without hard standing (e.g. diesel generators and other ICE powered static	EPC contractor (2 years)/Developer	EMMP, PPMP	Throughout the construction phase	Inspection reports

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						equipment) drip trays will be put in place and spill kits available; and				
139	7.5.7	C, O	Degradation of habitat from leaks and spills	Biodiversity	Recommended	Disposal and clean-up of any contamination arising from spills or leaks will be in accordance with the mitigation measures in Section 7.5.1.	EPC contractor (2 years)/Developer	EMMP	If required	Incident reports Inspection reports
140	7.5.7	O	Bird collision risk with solar panels	Biodiversity (fauna)	Mitigation	If high bird mortality rates are observed, a bird management plan will be developed and implemented, to include a measure of effectiveness of mitigation and deterrent measures that are implemented.	EPC contractor (2 years)/Developer	EMMP	If high bird mortality rate is observed	If required: Bird management plan Inspection reports
141	7.5.7	O	Bird collision and electrocution risk with OHTL and other project elements	Biodiversity (fauna)	Mitigation	Shade netting to be attached to the NOS perimeter chain-linked fencing	EPC contractor (2 years)/Developer	EMMP	During construction of fencing	Inspection report
142	7.6.2	C, O	Impacts on direct employment	People accessing jobs with the Project	Enhancement	Develop a Local Content Plan to include the following commitments: - The Project will work with local authorities and employment organisations to ensure that all positions are advertised in a manner that is accessible to the population in the AoI and in the Wilayat of Adam, by publicising the employment opportunities through the Wali's office. - The Project will ensure that the recruitment process is fair and transparent, public and open to all regardless of ethnicity, religion or gender by providing clear job descriptions focused on skills and qualifications, using diverse sourcing channels to reach underrepresented groups (i.e., through the Wali's office, jobseeker registration at the Ministry of Labour), and implementing a standardized application process. The Project will include equal opportunity statements in all job postings, actively monitor the recruitment process, and ensure alignment with legal requirements to promote fairness and inclusivity. - The Project will agree an Employment Strategy with Primary Contractors that will include the expected level of local input for unskilled labour. Contractors will be required to attempt to source all unskilled labour from within Oman, and with best efforts to recruit unskilled labour as well as skilled labour to the extent possible from the Social AoI	EPC contractor (2 years)/Developer	LCP	One off and reviewed annually/as required	Monitor recruitment process and actual rates of local direct and indirect Project activity as part of annual monitoring.

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						and the Wilayats of Adam. Agreed measures will be monitored and reported on.				
143	7.6.2	C, O	Impacts on direct employment	Economy, employment and income	Enhancement	The Stakeholder Engagement Plan developed for the Project will be regularly updated and will be implemented to outline how the Project will ensure regular, open and transparent communication with all stakeholders, concretely: - To provide clear information on the number and limited timescales of employment opportunities. - To ensure information on the employment and the procurement strategies is disclosed at all settlements within the Social AoI. - Initiate stakeholder engagement early on, starting during the ESIA phase, through inclusive dialogue to build a shared understanding of the potential positive and negative impacts of workers influx, and the associated risks and opportunities. - Continuing to engage local people in the employment opportunities and work with suppliers to enable capacity building, procurement, employment and contracting opportunities in the communities, as part of maximizing the positive benefits.	EPC contractor (2 years)/Developer	SEP	Regular update of the SEP	Regularly updated SEP in place
144	7.6.2	C, O	Impacts on direct employment	Economy, employment and income	Enhancement	The Community Grievance Management Procedure described in the Stakeholder Engagement Plan will be implemented to ensure that stakeholders who have concerns or complaints about the Project or wish to report their potential expectations or concerns related to local	EPC contractor (2 years)/Developer	Grievance Mechanism	Throughout the project	Grievance mechanism in place

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						economy and employment can communicate directly with the Project.				
145	7.6.2	C, O	Economic impacts from procurement of goods and services for the Project, payment of taxes and fees, and local spending	Economy, employment and income	Enhancement	Develop a Local Content Plan to include the following commitments - The Project will agree an Employment Strategy with Primary Contractors that will include the expected level of local input for unskilled labour. Contractors will be required to attempt to source all unskilled labour from within Oman, and with best efforts to recruit unskilled labour as well as skilled labour to the extent possible from the Social AoI and the Wilayat of Adam. Agreed measures will be monitored and reported on. - Continue to engage local people in the employment opportunities and work with suppliers to enable capacity building, procurement, employment and contracting opportunities in the communities, as part of maximizing the positive benefits. - Host local supplier workshops to provide information on the tender requirements and qualifications needed. - Identify opportunities to help local suppliers overcome gaps in their qualifications to be able to participate in tenders for project procurement.	EPC contractor (2 years)/Developer	LCP	One off and reviewed annually/as required	Monitor the implementation of the agreed Employment Strategy
146	7.6.2	C, O	Economic impacts from procurement of goods and services for the Project, payment of taxes and fees, and local spending	Economy, employment and income	Enhancement	Monitor actual rates of local direct and indirect Project activity to measure fulfilment of local employment commitment as part of annual monitoring. If improvements in local participation levels (including employment of women) are not achieved, identify obstacles and develop appropriate additional mitigation measures. Report on results as part of regular reporting, making continuous improvement an objective.	EPC contractor (2 years)/Developer	LCP	Annually	Monitoring reports as part of regular reporting.
147	7.6.2	C, O	Economic impacts from procurement of goods and services for the Project, payment	Economy, employment and income	Enhancement	Implement and monitor the Grievance Management Framework and the Stakeholder Engagement Plan.	EPC contractor (2 years)/Developer	SEP & Grievance mechanism	Throuhgout the project and regularly monitored	Monitoring and reporting activities described in the SEP, including those of the Grievance mechanism management process.

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			of taxes and fees, and local spending							
148	7.6.2	C, O	Impacts on Training and Work Experience	Economy, employment and income	Enhancement	All workforce members, including subcontractors, will undergo induction training covering project specifics, environmental, health, safety, and social responsibilities. This includes familiarization with the applicable regulatory requirements, and internal processes for incident and emergency response.	EPC contractor (2 years)/Developer	OHSP, WMP	One off at induction	Induction material Training attendance/completion/achievement records
149	7.6.2	C, O	Impacts on Training and Work Experience	Economy, employment and income	Enhancement	Ongoing toolbox talks and tailored training sessions will address specific site activities, potential environmental hazards, and key occupational health and safety topics. These sessions will also cover the importance of safe work practices, appropriate behavior, and adherence to environmental controls.	EPC contractor (2 years)/Developer	OHSP, WMP	Weekly toolbox	Induction material Training attendance/completion/achievement records
150	7.6.2	C, O	Impacts on Training and Work Experience	Economy, employment and income	Enhancement	Subcontractors must establish and deliver training programs for their teams, which will be subject to approval and audit to ensure adequacy and compliance. These programs must ensure that all personnel are trained, competent, and aware of their responsibilities.	EPC contractor (2 years)/Developer	WMP	Throuhgout the project and regularly monitored	Approval of subcontractor training plans
151	7.6.2	C, O	Impacts on Training and Work Experience	Economy, employment and income	Enhancement	Training will be customized for different work areas (e.g., waste management), and will include topics such as environmental hazard avoidance, proper waste disposal, and adherence to site-specific protocols. A competent trainer will deliver engaging, audience-specific content, with regular refreshers to address changes in site conditions or activities.	EPC contractor (2 years)/Developer	WMP	As required	Training Program agreed and updated as required
152	7.6.2	C, O	Impacts on Training and Work Experience	Economy, employment and income	Enhancement	Training will include cultural awareness to prevent conflicts with local communities, promote respectful behavior, and reinforce the importance of following internal grievance procedures and worker welfare policies.	EPC contractor (2 years)/Developer	WMP	As required	Induction material Training attendance/completion/achievement records
153	7.6.2	C, O	Impacts on Training and Work Experience	Economy, employment and income	Enhancement	The EPC Contractor and subcontractors to provide induction training and toolbox talks relating to the Change Find Procedure during early works and whenever deemed necessary.	EPC contractor (2 years)/Developer	WMP	At induction and weekly toolbox	Induction material Training attendance/completio

ID	ESIA Section Reference	Project Phase	Associated project impact	Receptors	Type of Commitment	Specific Commitment/Action	Responsible Party for Implementation	Associated Management /Monitoring Plan	Performance Monitoring *(proposed timing and frequency - subject to construction and operation activities and contractor management plans)*	Controls *(proposed controls - subject to construction and operation activities and contractor management plans)*
										n/achievement records
154	7.6.2	C, O	Impacts on Training and Work Experience	Economy, employment and income	Enhancement	Attendance sheets for all training sessions will be maintained, recording the details of the training, facilitator, and participants to ensure accountability and track training completion.	EPC contractor (2 years)/Developer	WMP	For all training	Attendance sheets
155	7.6.2	C, O	Impacts on Training and Work Experience	Economy, employment and income	Enhancement	The training programme should cover technical matters relevant to the job to be performed, general and job-specific occupational health and safety matters, as well as policies on the expected behaviour at the workplace and when in contact with members of the community.	EPC contractor (2 years)/Developer	WMP	For all training	Training Program in place
156	7.6.2	C, O	Impacts on Training and Work Experience	Economy, employment and income	Enhancement	Track implementation of training plan and review it according to emerging concerns related to or that might impact the Project.	EPC contractor (2 years)/Developer	WMP	As required	Training program regularly reviewed and updated as required
157	7.6.3	C	Increased Traffic Volumes	Public infrastructure and services	Mitigation	A Traffic Management Plan (TMP) will be developed in consultation with the competent authorities, traffic police and municipalities, and implemented throughout construction. The following measures will be adopted in the Project TMP: - Construction access roads will be clearly marked with signs for directions and speed limits, with routes, parking, and unloading areas defined in the TMP. - All drivers will be trained, authorized, and required to adhere to designated routes and timings. Road safety training and TMP guidelines will be provided. - Relevant authorities, local leaders, and communities will be informed about planned transportation routes and timings. Advance warnings will be given for road diversions and closures. - A mechanism will be established for local communities to file traffic and transportation complaints, with compensation for injured livestock coordinated with local authorities. - Deliveries will be scheduled to minimize impacts on road users, avoid vehicle queuing, and consider local conditions	EPC contractor	TMP	one off and updated as required	Approved TMP in place Inspection reports

ID	ESIA Section Reference	Project Phase	Associated project impact	Receptors	Type of Commitment	Specific Commitment/Action	Responsible Party for Implementation	Associated Management /Monitoring Plan	Performance Monitoring *(proposed timing and frequency - subject to construction and operation activities and contractor management plans)*	Controls *(proposed controls - subject to construction and operation activities and contractor management plans)*
						and stakeholder feedback. - The TMP will enforce speed limits across all traffic routes.				
158	7.6.3	C	Increased Traffic Volumes	Public infrastructure and services	Mitigation	A grievance mechanism will be established to allow local communities to make complaints relating to traffic and transportation.	EPC contractor	TMP, Grievance Mechanism	Throuhgout the project and regularly monitored	TMP in place Monitoring and reporting activities described in the SEP, including those of the Grievance mechanism management process.
159	7.6.3	C	Increased Traffic Volumes	Public infrastructure and services	Mitigation	As part of a Project-related public engagement programme, regularly inform, educate, and update stakeholders and communities close to transport routes about Project traffic, especially about the safety issues and scheduling associated with movement of heavy-load vehicles on public roads.	EPC contractor	SEP, TMP	Regularly	SEP in place, Agenda for stakeholder meetings, Minutes of meetings, SEP in place
160	7.6.3	C	Increased Traffic Volumes	Public infrastructure and services	Mitigation	Compensation for any injured livestock will be conducted in coordination with the Wali.	EPC contractor	SEP	As required	Documented agreement on compensation
161	7.6.3	C	Increased Traffic Volumes	Public infrastructure and services	Mitigation	The Contractor will comply with all statutory vehicle limits (width, height, loading, gross weight) and any other statutory requirement. Establish and implement standards addressing the following: - Driver fitness standards as per the Oman Society for Petroleum Services Road Safety Standard, including mandatory rest periods and prohibition of drug/alcohol use. - In-vehicle monitoring systems to monitor vehicle speed and location (Project vehicles and contractors).	EPC contractor	TMP	Throughout the project	Standards in place Regular incident reports

ID	ESIA Section Reference	Project Phase	Associated project impact	Receptors	Type of Commitment	Specific Commitment/Action	Responsible Party for Implementation	Associated Management /Monitoring Plan	Performance Monitoring *(proposed timing and frequency - subject to construction and operation activities and contractor management plans)*	Controls *(proposed controls - subject to construction and operation activities and contractor management plans)*
						- Project and contractor standards for vehicle safety and maintenance. - Security response for vehicle incidents. - Load stability standards.				
162	7.6.3	C	Increased Traffic Volumes	Public infrastructure and services	Mitigation	Any road damage will be repaired to an equal or better standard in a timely manner. Restore signs, streetlights and other street furniture removed for or damaged by the movement of Project-related trucks.	EPC contractor	TMP	If any road damage occurs	Documented status of road before and after damage
163	7.6.3	C	Increased Traffic Volumes	Public infrastructure and services	Mitigation	The Contractor’s procedures shall specifically cover arrangements for the following important aspects: - The source of and number of qualified drivers required. - Training and approval requirements for drivers. - Hours of driving and rest periods. - Security arrangements for drivers, vehicles and loads. - Arrangements for driver communication with control points and vehicle equipment. - Language/communication issues. - The source of suitable vehicles (e.g. quality and specification). - The number of vehicles required. - The programme for preventative vehicle maintenance. - Vehicle routes, route planning and alternative routes. - Overall vehicle movements. - Procedures for the emergency recovery of vehicles. - Procedures for spot checks and audits of the transport system and for reporting problems.	EPC contractor	TMP	One off and updated as required	Approved contractor's procedures
164	7.6.3	C	Increased Traffic Volumes	Public infrastructure and services	Mitigation	The contractor will be required to undertake regular inspections to ensure adherence to the TMP.	EPC contractor	TMP	Regularly	Inspection reports

ID	ESIA Section Reference	Project Phase	Associated project impact	Receptors	Type of Commitment	Specific Commitment/Action	Responsible Party for Implementation	Associated Management /Monitoring Plan	Performance Monitoring *(proposed timing and frequency - subject to construction and operation activities and contractor management plans)*	Controls *(proposed controls - subject to construction and operation activities and contractor management plans)*
165	7.6.3	O	Increased Traffic Volumes	Public infrastructure and services	Recommended	In addition, to adheringe to the Oman Society for Petroleum Services Road Safety Standard, adjust the Traffic Management Plan for the operational phase and include the following requirements: - Adherence to the Traffic Management Plan by contractors. - Training and accreditation for Project drivers, including contractors. - Driver fitness standards, including mandatory rest periods and prohibition of drug/alcohol use. - Mandatory speed limits on Project roads. - In-vehicle monitoring systems to monitor vehicle speed and location (Project vehicles and contractors). - Project and contractor standards for vehicle safety and maintenance. - Security response for vehicle incidents.	EPC contractor (2 years)/Developer	TMP	one off and updated as required Ongoing monitoring of grievances	TMP in place and inspection reports Grievance log
166	7.6.4	C	Incidence of communicable or infectious diseases during construction	Community health and safety	Mitigation	A Workers Management Plan (WMP) will be developed, including the commitments listed in the referred section.	EPC contractor	WMP	one off and updated as required	Approved plan in place Inspection reports
167	7.6.4	C	Incidence of communicable or infectious diseases during construction	Community health and safety	Mitigation	The Traffic Management Plan will also include : - Any trucking companies employed to work on the Project will have policies around health screening of their workers in line with Project requirements; - Contractors and subcontractors will ensure that all truck drivers who will work on site receive the training on the worker CoC and disease awareness training; and - At the site perimeter, the EPC Contractor will review routes and journey plans for the truckers, including likely stopping points or rest stops. The EPC Contractor will provide details of the grievance mechanism at these locations.	EPC contractor	TMP, CHMP	One off and updated as required	Approved plans in place Inspection reports Grievance log
168	7.6.4	C	Incidence of communicable or infectious diseases during construction	Community health and safety	Mitigation	The Project Proponent will implement the community grievance mechanism to address stakeholder concerns related to the Project in a timely manner.	EPC contractor	SEP & Grievance mechanism	One off and updated as required	Grievance mechanism in place Grievance log

ID	ESIA Section Reference	Project Phase	Associated project impact	Receptors	Type of Commitment	Specific Commitment/Action	Responsible Party for Implementation	Associated Management /Monitoring Plan	Performance Monitoring *(proposed timing and frequency - subject to construction and operation activities and contractor management plans)*	Controls *(proposed controls - subject to construction and operation activities and contractor management plans)*
169	7.6.4	O	Incidence of communicable or infectious diseases during construction	Community health and safety	Mitigation	The Workers Management Plan will include the measures applicable to the operations phase indicated in the referred section.	EPC contractor (2 years)/Developer	WMP	one off and updated as required	Approved plan in place Inspection reports Induction material Training attendance/completion/achievement records
170	7.6.4	O	Incidence of communicable or infectious diseases during construction	Community health and safety	Mitigation	The community grievance mechanism will be maintained during the operation phase of the Project.	EPC contractor (2 years)/Developer	SEP & Grievance mechanism	Throughout the operation	SEP & Grievance mechanism in place
171	7.6.5	C, O	Impacts on workers' rights	Project workers	Mitigation	The EPC contractor will be required to apply TTE/OAQE Health, Safety, Social, Security and Environmental requirements during all phases of the work.	EPC contractor (2 years)/Developer	OHSP	Throughout the project	Ongoing monitoring EPC Contractor HSSSE performance
172	7.6.5	C, O	Impacts on workers' rights	Project workers	Mitigation	The Project will develop an Occupational Health and Safety (OHS) Plan as part of a Health and Safety Management System (HSMS) as per indicated in referred Section.	EPC contractor (2 years)/Developer	OHSP	Prior to workers mobilisation and updated as required	OHS Plan in place and updated as required
173	7.6.5	C, O	Impacts on workers' rights	Project workers	Mitigation	A Workers Management Plan (WMP) will be developed as per indicated in referred Section.	EPC contractor (2 years)/Developer	Worker MP	Prior to workers mobilisation and updated as required	WMP in place
174	7.6.5	C, O	Impacts on workers' rights	Project workers	Mitigation	A Worker Grievance Mechanism (WGM) will be developed as per indicated in referred Section.	EPC contractor (2 years)/Developer	SEP & Grievance mechanism	Prior to workers mobilisation and updated as required	WGM in place
175	7.7	C	Large/Major Leaks/Spills of Oil, Fuel, Chemicals And Wastes	Unplanned events	Mitigation	Environmental, social, health and safety (EHS) training of construction staff to minimize the occurrence of environmental impacts to the work area and prepare appropriate response (including training on EHS through EHS induction programme as well as routine training refreshers).	EPC contractor	OHSP	As per training programme	Training/Induction material Training attendance/completion/achievement records
176	7.7	C, O	Large/Major Leaks/Spills of Oil, Fuel, Chemicals And Wastes	Unplanned events	Mitigation	The Project will prepare and implement an Emergency Response Plan (ERP) and a Pollution Prevention and Control Plan including an Oil Spill Contingency Plan (OSCP). The Project will maintain spill clean-up and response capability adequate for addressing spills for all phases of the Project. All spills will be immediately	EPC contractor (2 years)/Developer	ERP, PPCP	one off and updated as required	Approved plan in place Incident reports Inspection reports

ID	ESIA Section Reference	Project Phase	Associated project impact	Receptors	Type of Commitment	Specific Commitment/Action	Responsible Party for Implementation	Associated Management /Monitoring Plan	Performance Monitoring *(proposed timing and frequency - subject to construction and operation activities and contractor management plans)*	Controls *(proposed controls - subject to construction and operation activities and contractor management plans)*
						contained and cleaned up. Contaminated areas will be remediated and post remediation verification will be carried out.				
177	7.7	C, O	Large/Major Leaks/Spills of Oil, Fuel, Chemicals And Wastes	Unplanned events	Mitigation	Electrical transformers containing oils must be installed on the site with adequate anti-leakage equipment (EA's Local permit condition, October 2024).	EPC contractor (2 years)/Developer	PPCP	Monitoring measure as per permit condition	Inspection reports
178	7.7	C, O	Large/Major Leaks/Spills of Oil, Fuel, Chemicals And Wastes	Unplanned events	Mitigation	The Project will prepare and implement a Hazardous Materials Management Plan to mitigate and manage spills of hazardous materials during all phases of the Project.	EPC contractor (2 years)/Developer	HMMP	one off and updated as required	Approved plan in place Inspection reports
179	7.7	C, O	Large/Major Leaks/Spills of Oil, Fuel, Chemicals And Wastes	Unplanned events	Mitigation	Oil will be stored at designated areas with secondary containment.	EPC contractor (2 years)/Developer	PPCP	One off and regular monitoring	Inspection reports
180	7.7	C, O	Large/Major Leaks/Spills of Oil, Fuel, Chemicals And Wastes	Unplanned events	Mitigation	Refuelling of equipment and vehicles will be carried out in designated areas on hard standing ground to prevent seepage of any spillages to ground. Collection systems will be installed in these areas to manage any spills, fuels will be collected and either reused, treated by incineration, or removed by a local contractor. Drip trays must be used when refuelling and servicing vehicles or equipment, where it is not on a hard standing surface.	EPC contractor (2 years)/Developer	PPCP	One off and regular monitoring	Inspection reports
181	7.7	C, O	Large/Major Leaks/Spills of Oil, Fuel, Chemicals And Wastes	Unplanned events	Mitigation	Hazardous material storage will be on hard standing and impermeable surface and the bulk storage facility will be bunded. The Project will restrict storage and handling of hazardous materials and fuels to bunded areas of sufficient capacity to contain a release. Storage containers will be regularly checked and maintained.	EPC contractor (2 years)/Developer	HMMP	regular monitoring	Inspection reports
182	7.7	C, O	Increased Risk of Accidents and Injuries Related	Unplanned events	Mitigation	A Traffic Management Plan (TMP) will be developed in consultation with the competent authorities, traffic police and municipalities, and implemented throughout construction.	EPC contractor (2 years)/Developer	TMP	Prior to start of construction works and updated as required	Approved plan in place Grievance log

ID	ESIA Section Reference	Project Phase	Associated project impact	Receptors	Type of Commitment	Specific Commitment/Action	Responsible Party for Implementation	Associated Management /Monitoring Plan	Performance Monitoring *(proposed timing and frequency - subject to construction and operation activities and contractor management plans)*	Controls *(proposed controls - subject to construction and operation activities and contractor management plans)*
			to Project Road Traffic							
183	7.7	C, O	Increased Risk of Accidents and Injuries Related to Project Road Traffic	Unplanned events	Mitigation	Monitor grievances received related to Project road traffic and capture feedback on this topic from stakeholder engagement meetings.	EPC contractor (2 years)/Developer	SEP & Grievance mechanism	regular monitoring	Grievance log
184	7.7	C, O	Increased Risk of Accidents and Injuries Related to Project Road Traffic	Unplanned events	Mitigation	Track incidence and severity of traffic accidents associated with Project road traffic.	EPC contractor (2 years)/Developer	TMP	regular monitoring	Incident reports Inspection reports
185	7.7	O	Aviation Incident with Solar PV Farm	Unplanned events	Mitigation	Fluid communication with CAA, aviation and airport officials to be established.	EPC contractor (2 years)/Developer	SEP	one off and ongoing	SEP in place Communications exchanges with stakeholders
186	7.9.2.4	C, O	Cumulative Impacts	Cumulative Impacts	Mitigation	Apply a hierarchical mitigation methodology of the environmental and social impacts management generated by different Projects on the VEC (ecological or human): Avoid, Minimize, Compensate, and offset	EPC contractor (2 years)/Developer	-	Throughout the project	Records
187	7.9.2.4	C, O	Cumulative Impacts	Cumulative Impacts	Mitigation	Engage with other developers in the vicinity to address shared concerns. Ensure that cumulative impacts are discussed during these engagements. Where cumulative impacts are clearly identified, develop a Cumulative Impact Strategy, since cumulative impacts cannot be managed at a single Project level.	EPC contractor (2 years)/Developer	-	Throughout the project	Records
188	7.9.2.4	C, O	Cumulative Impacts	Cumulative Impacts	Mitigation	The management of cumulative effects is the shared responsibility of various proponents and actors. The proponent of a Project can take actions to minimize the contribution of its individual effects to cumulative effects. If individual actions are not sufficient to mitigate cumulative impacts, collaborative efforts are required (IFC, 2013).	EPC contractor (2 years)/Developer	-	Throughout the project	Records

ID	ESIA Section Reference	Project Phase	Associated project impact	Receptors	Type of Commitment	Specific Commitment/Action	Responsible Party for Implementation	Associated Management /Monitoring Plan	Performance Monitoring *(proposed timing and frequency - subject to construction and operation activities and contractor management plans)*	Controls *(proposed controls - subject to construction and operation activities and contractor management plans)*
189	7.9.2.4	C, O	Cumulative Impacts	Cumulative Impacts	Mitigation	Ideally, cumulative impact management should be led by government entities that have direct influence on proponents, in order to identify the contributions of each actor and establish the mechanism to handle the cumulative effects. International best practice establishes that individual proponents should mitigate the effects generated by their Project and, at a minimum, support and influence cumulative effects management strategies (IFC, 2013).	EPC contractor (2 years)/Developer	-	Throughout the project	Records

8.4.1 CUMULATIVE IMPACTS

Main mitigation measures related to cumulative impacts are those adopted by the Project to address the significant impacts identified in order to reduce to the extent possible the remaining residual impacts.

However, solutions to address properly the cumulative effect derived from the development of several projects in a given area are beyond any individual project developer. In this context, the approach adopted by TTE to mitigate the cumulative impacts will be to use their best efforts to engage other developers, governments, and other stakeholders by acknowledging the cumulative impacts and risks and suggesting coherent management strategies to mitigate them.

In this context, TTE/OQAE will promote the following actions so as to ensure proper coordination with relevant authorities and other developments to minimize cumulative impacts:

- Apply a hierarchical mitigation methodology of the environmental and social impacts management generated by different Projects on the VEC (ecological or human): Avoid, Minimize, Compensate, and offset.
- Engage with other developers in the vicinity to address shared concerns. Ensure that cumulative impacts are discussed during these engagements. Where cumulative impacts are clearly identified, develop a Cumulative Impact Strategy, since cumulative impacts cannot be managed at a single Project level.
- The management of cumulative effects is the shared responsibility of various proponents and actors. The proponent of a Project can take actions to minimize the contribution of its individual effects to cumulative effects. If individual actions are not sufficient to mitigate cumulative impacts, collaborative efforts are required (IFC, 2013).
- Ideally, cumulative impact management should be led by government entities that have direct influence on proponents, in order to identify the contributions of each actor and establish the mechanism to handle the cumulative effects. International best practice establishes that individual proponents should mitigate the effects generated by their Project and, at a minimum, support and influence cumulative effects management strategies (IFC, 2013).

8.5 SPECIFIC MANAGEMENT PLANS AND PROCEDURES

The ESIA process has identified plans (and policies) that will be prepared by TTE/OAQE and/or its chosen EPC, prior to the commencement of construction, as part of an integrated ESMMP system. Some of these plans maybe combined where appropriate.

E&S Management plans & procedures	Comments
Construction Environmental Management and Monitoring Plan (CEMMP)	As defined in section 8.1.2. At least the following topics to be included: • Energy consumption monitoring (to track energy efficiency and reduction KPIs) • Noise management recommended measures, • Air quality management/monitoring measures • Vehicles and Equipment Maintenance Program • Landscape and visual mitigation measures

E&S Management plans & procedures	Comments
	• Biodiversity mitigation and monitoring measures (including those related to invasive species and no net loss)
Operational Environmental Management and Monitoring Plan (OEMMP)	Following topics to be included • GHG monitoring requirements (IPPC) • Noise monitoring measures (first year), • Vehicles and Equipment Maintenance Program • Biodiversity mitigation and monitoring measures (including those related to invasive species and no net loss)
Traffic Management Plan (all phases)	
Pollution Prevention and Control plan (all phases)	
Waste Management plan (all phases)	
Hazardous Materials Management Plan (all phases)	
Water and Wastewater Management Plan (all phases)	
Climate Change Risk Management Plan	As per EP4 Guidance Note (2023). Include a Heat Stress Management Procedure
Stakeholder Engagement Plan including Grievance Procedure (all phases)	
Human Resources Policy	Including • Local Procurement Policy, • Local Content Plan
Workers Management Plan	Including • Worker's Code of Conduct, • Camp management (including food hygiene procedure)
Occupational Health and Safety (OHS) Plan (all phases)	
Community H&S Management Plan	
Emergency Preparedness and Response Plan (all phases)	
Decommissioning Management Plan	

The proposed Management Plans are intended to be 'live' documents and therefore shall be regularly updated as the project evolves and movement requirements are known therefore in more detail. The following plans will be established through engagement with other actors where applicable such as the ESMMP. In addition, the development of plans such as health and safety plans and the influx management plan be carried out with the support of government to mitigate cumulative impacts.

8.5.1 ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

As per section 8.1.2. and encompassing the Project's commitment Register.

8.5.2 TRAFFIC MANAGEMENT PLAN

A Traffic Management Plan (TMP) will be developed to set out the necessary requirements to be implemented by the project to mitigate potential risks and/or avoid negative factors to the environment, workers, and adjacent community with regards to the traffic during the phases of construction and operations. It shall be developed in compliance with the requirements of Omani regulations and relevant international standards (IFC).

The Traffic Management Plan (TMP) will be developed in consultation with the competent authorities, traffic police and municipalities, and implemented throughout construction. The following measures will be adopted in the Project TMP:

- Construction access roads will be clearly marked with signs for directions and speed limits, with routes, parking, and unloading areas defined in the TMP.
- All drivers will be trained, authorized, and required to adhere to designated routes and timings. Road safety training and TMP guidelines will be provided.
- Relevant authorities, local leaders, and communities will be informed about planned transportation routes and timings. Advance warnings will be given for road diversions and closures.
- A mechanism will be established for local communities to file traffic and transportation complaints, with compensation for injured livestock coordinated with local authorities.
- Deliveries will be scheduled to minimize impacts on road users, avoid vehicle queuing, and consider local conditions and stakeholder feedback.
- The TMP will enforce speed limits across all traffic routes.

The Project Proponent shall adjust the Traffic Management Plan for the operational phase and include the following requirements:

  - Adherence to the Traffic Management Plan by contractors.
  - Training and accreditation for Project drivers, including contractors.
  - Driver fitness standards, including mandatory rest periods and prohibition of drug/alcohol use.
  - Mandatory speed limits on Project roads.
  - In-vehicle monitoring systems to monitor vehicle speed and location (Project vehicles and contractors).
  - Project and contractor standards for vehicle safety and maintenance.
  - Security response for vehicle incidents.

The Traffic Management Plan will also include:

- Any trucking companies employed to work on the Project will have policies around health screening of their workers in line with Project requirements;
- Contractors and subcontractors will ensure that all truck drivers who will work on site receive the training on the worker CoC and disease awareness training; and
- At the site perimeter, the EPC Contractor will review routes and journey plans for the truckers, including likely stopping points or rest stops. The EPC Contractor will provide details of the grievance mechanism at these locations.

8.5.3 POLLUTION PREVENTION AND CONTROL PLAN

The Pollution Prevention and Control Plan (PPCMP) will be developed to cover all project phases and will be aligned with the Emergency Response Plan. The plan will be produced following relevant Omani legal requirements and best international practices and will include provisions for the training of all workers and procedures related to communications to stakeholders and community improvement opportunities like workers and public awareness plans regarding pollution prevention and environment protection.

Typically, a Pollution Prevention and Control Plan covers the following elements:

- General measures to be followed on site during the construction phase. General measures will include housekeeping, good material handling practices and inspection procedures.
- Prevention of accidental spills through the application of a series of actions and measures to prevent leakages and spills and to enable effective response to unplanned releases of liquids, such as fuels, oils and chemicals.
- Product Specific Practices will be adopted for the following:
    - Petroleum products: vehicles and construction equipment will be monitored for leaks and receive regular preventive maintenance to reduce the potential for leakage. Petroleum products will be stored in tightly sealed containers that are clearly labelled;
    - Paints: containers will be tightly sealed and properly stored when not required for use. All excess paint materials will be properly disposed of according to manufacturer's instructions.
- Isolation of Potentially Hazardous Materials: supply of drums will be available for use in the event of spills or if potentially hazardous materials are found during project construction. The contaminated material will be placed in the drums, sealed and placed in the storage area to await proper characterization and disposal. In the event that a larger amount of material needs to be isolated, it will be placed directly into a lined roll-off container from a licensed hazardous waste transporter. The roll-off container will be placed out of the flow of construction traffic and equipment, in a bermed area to contain and isolate possible leaks and rainwater.
- Product Substitution: a policy of using environmentally friendly products will be adopted. In particular, when feasible, non-chlorinated solvents, paints with low volatile organic compound content, and non lead-based paints will be used. Organic biocides will replace chlorine in cooling water systems, if feasible, and assessment will be developed to determine the availability of less harmful substances. A list of prohibited materials will be provided, these will be prohibited from purchase due to their extreme hazardous or toxic nature.

In addition, the Pollution Prevention and Control Plan will establish the management procedures (collection, storage, treatment and disposal) for those wastewater streams not addressed in the Waste Management Plan, including sewage discharge.

It also defines:

- auditing requirements;
- reporting and follow up;

- awareness initiatives; and
- roles and responsibilities.

The PPCP will be developed in accordance with TTE standard GM EP ENV 092 to appropriately manage spills during all phases of the Project (see description in Section 3 Project Description). The plan will include typical industry standard spill management (e.g. drip pans and dedicated work areas) where appropriate and all waste will be appropriately contained before removal to licensed waste facilities.

8.5.4 WASTE MANAGEMENT PLAN

TTE/OAQE shall develop and implement a Waste Management Plan (WMP) which defines how wastes, including solid and liquid waste, will be reduced, re-used, collected, managed, recycled and disposed of in an appropriate manner and in accordance with national legislation and good international practice.

The WMP will provide the basis for all the waste management arrangements and act as a central point of reference for how wastes will be managed by the Project. The WMP will cover the following aspects:

- Purpose/Objectives – of the Plan
- Context – legal requirements and general principles
- Roles and Responsibilities – of different staff and contractors
- Waste Arising (Types and quantities of key waste streams and Waste classification – local/international) per defined period (e.g. month, year)
- Waste Minimisation
- Waste Storage and On-site Handling (including segregation of different waste types)
- Reuse and Recycling
- Waste Collection and Transfer
- Final Treatment and Disposal (taking into account the waste acceptance criteria provided by the final treatment and disposal facilities selected)
- Waste Tracking, Data Management and Reporting
- Communications/Community Liaison

8.5.5 HAZARDOUS MATERIALS MANAGEMENT PLAN

The hazardous materials management plan (HMMP) should include measures to manage the risks associated with the production, handling, storage, and use of hazardous materials. Measures may include:

- Provide secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids which is at least 110% of the largest container or 25% of the total volumes of fuel and fluids stored (whichever is greater).
- Undertake refuelling and other fluid transfer only in areas with impervious surfaces.
- Develop procedures for transfer and handing of fuels and chemicals and the response to spills including use of spill kits.
- Provide training on transfer and handing of fuels and chemicals and the response to spills for workers involved in the handing of fuels and chemicals.

- Provide any specific personal protective equipment (PPE) required to respond to an emergency and training on its use.
- Provide spill kits, portable spill containment and clean up equipment on site in areas where fuel and chemical handling takes place.
- Identify training requirements for personnel handling hazardous materials.

8.5.6 WATER AND WASTEWATER MANAGEMENT PLAN

The overall objective of the Water and Wastewater Management Plan (WWMP) is to ensure an adequate management of water resource and minimize the risks associated with water resource selection and consumption for the Project activities as well as wastewater management. Water will be used and disposed of in a manner consistent with Omani legislation and where appropriate, international good practices.

Objectives of this Water and Wastewater MP can be summarized as follows:

- Ensure compliance with local legislation/permitting regulations and industry best standards, developing necessary management practices;
- Describe methods for assessing and protecting water uses and resources that may be impacted by project activities or operations (e.g. drinking uses, ground water for agricultural irrigation, other users that are not beneficiaries to the project, etc.);
- Apply sustainable criteria to identify opportunities for water savings and define objectives and targets, which should be continuously revised and updated to prevent fluctuations in surface or groundwater levels;
- Identify appropriate activities and indicators to incorporate into the monitoring program to control the water used;
- Draft a contingency plan in case monitoring indicators identify supply problems of the local communities due to water shortages; and
- Define the responsible parties required to ensure the achievement of each objective and identify their required trainings in water management.
- Define management procedures for wastewater collection, storage, treatment and disposal.

8.5.7 CLIMATE CHANGE RISK QUANTIFICATION AND MANAGEMENT PLAN

In order to fully align with EP4's 2023 Guidance Note, during later stages of the Project the Project Proponent will be required to:

1) financially quantify the risks which have been identified in Phase 1 as potentially material to the Project (Phase 2) and;

2) to show how these risks are being managed/mitigated within a Climate Change Risk Management Plan (CCRMP) (Phase 3).

8.5.8 STAKEHOLDER ENGAGEMENT PLAN

The Stakeholder Engagement Plan (SEP) is intended to build and maintain positive relationships between the Project and relevant stakeholders. It establishes procedures for constructive engagement and continuous dialogue that are essential to good business practice and corporate citizenship, as well as Project risk management and performance improvement.

The SEP Framework is presented in Appendix F and it includes:

- Description of national regulatory, internal company requirements and international standards
- Identification and assessment of the Project stakeholders
- Strategy and proposed engagement actions with stakeholder per Project phase;
- Resources and responsibilities for implementing stakeholder engagement activities; and
- Monitoring and reporting of SEP activities.

Additionally, to further enhance the potential positive local economy and employment impacts of the Project, the Stakeholder Engagement Plan developed for the Project will be regularly updated and will be implemented to outline how the Project will ensure regular, open and transparent communication with all stakeholders, concretely:

- To provide clear information on the number and limited timescales of employment opportunities.
- To ensure information on the employment and the procurement strategies is disclosed at all settlements within the Social AoI.
- To plan an engagement with stakeholders through early, inclusive dialogue to build a shared understanding of the potential positive and negative impacts of workers influx, and the associated risks and opportunities.
- Continuing to engage local people in the employment opportunities and work with suppliers to enable capacity building, procurement, employment and contracting opportunities in the communities, as part of maximizing the positive benefits.

The SEP, together with the Grievance Management Framework, will be monitored once implemented.

As part of a Project-related public engagement programme, regularly inform, educate, and update stakeholders and communities close to transport routes about Project traffic, especially about the safety issues and scheduling associated with movement of heavy-load vehicles on public roads. Compensation for any injured livestock will be conducted in coordination with the Wali.

The SEP will also include specific measures to engage with stakeholders affected by Project land-take in order to verify and assess their ability to adapt to the restriction on accessing grazing areas affected by the Project.

8.5.9 COMMUNITY GRIEVANCE MECHANISM

The Community Grievance Management Procedure (CGMP) describes the process, roles and responsibilities for registering, investigating, resolving and remedying local stakeholders' grievances received.

The Grievance Mechanism describes the different stages of the process that each grievance follows:

- Grievance reception
- Grievance acknowledgment
- Grievance assess and assign
- Grievance investigation
- Grievance resolution proposal
- Grievance follow up and close-out

Section 7 of the SEP describes the Community Grievance Mechanism (Appendix F).

Moreover, the Community Grievance Management Procedure described in the Stakeholder Engagement Plan will be implemented to ensure that stakeholders who have concerns or complaints about the Project or wish to report their potential expectations or concerns related to local economy and employment can communicate directly with the Project. The Grievance Mechanism will also allow local communities to make complaints relating to traffic and transportation.

The Project Proponent will implement the community grievance mechanism to address stakeholder concerns related to the Project in a timely manner and it will be maintained during the operation phase of the Project.

8.5.10 LOCAL CONTENTS PLAN AND LOCAL PROCUREMENT POLICY

The objective of the Local Content Plan (LCP) and Local Procurement Policy (LPP) is to ensure the management and control of activities aimed at maximizing workforce, goods and services on the project and developing capacity among the employees and the local suppliers but also the local communities and supply chain.

This Plan sets out opportunities, TTE/OQAE will use commercially reasonable efforts to require and encourage contractors, or other intermediaries procuring labour, goods and services, to apply comparable standards.

The Local Content Plan to include the following commitments:

- The Project will work with local authorities and employment organisations to ensure that all positions are advertised in a manner that is accessible to the population in the AoI and in the Wilayat of Adam.
- The Project will ensure that the recruitment process is fair and transparent, public and open to all regardless of ethnicity, religion or gender.
- The Project will agree an Employment Strategy with Primary Contractors that will include the expected level of local input for unskilled labour. Contractors will be required to attempt to source all unskilled labour from within Oman, and with best efforts to recruit unskilled labour as well as skilled labour to the extent possible from the Social AoI and the Wilayats of Adam. Agreed measures will be monitored and reported on.

The Plan shall monitor actual rates of local direct and indirect Project activity to measure fulfilment of local employment commitment as part of annual monitoring. If improvements in local participation levels (including employment of women) are not achieved, identify obstacles and develop appropriate additional mitigation measures. Report on results as part of regular reporting, making continuous improvement an objective.

8.5.11 WORKERS MANAGEMENT PLAN

The Workers Management Plan (WMP) will be developed to address potential risks to worker rights and labour standards by summarizing expectations and procedures to maintain quality working conditions and activities, including accommodation facilities.

The WMP will be informed by the findings and recommendations of the Human Rights Risk Assessment.

The specific objectives of the Workers Management Plan will refer to the following:

- Promote the fair treatment, non-discrimination, and equal opportunity of workers
- Establish, maintain, and improve the worker-management relationship;
- Promote compliance with national employment and labour laws;
- Protect workers, including vulnerable categories of workers such as migrant workers, workers engaged by third parties, and workers in the client's supply chain;
- All expat workers employed should be under equivalent contractual terms and condition terms of Omani workers carrying out similar work;
- Promote safe and healthy working conditions, and the health of workers, also in relation to workers' accommodation camp and housing requirements;
- Establish a formal workers grievance mechanism; and
- Ensure avoidance of child labour and forced labour.

The Workers Management Plan will include:

- Implementation of a Workforce Code of Conduct (CoC) commits all persons engaged by the EPC contractor, including sub-contractors and suppliers, to acceptable standards of behavior. The CoC must include sanctions for non-compliance. The CoC should be written in plain language and signed by each worker to indicate that they have:
  - received a copy of the CoC as part of their contract;
  - had the CoC explained to them as part of induction process;
  - acknowledged that adherence to this CoC is a mandatory condition of employment;
  - understood that violations of the CoC can result in serious consequences, up to and including dismissal, or referral to legal authorities.
- Conduct pre-employment screening protocols for all workers including contractors and subcontractors which will include testing for communicable diseases of concern and vaccinations.
- Provision of awareness training about transmission routes and methods of prevention of communicable diseases of concern as well as early symptoms of such diseases. Training will be provided during induction, and at least every two years, or more often if the WHO Pandemic Alert Scale reaches Level 4.
- All workers (Omani and non-Omani will be provided with primary health care and basic first aid at the PDO camps.
- Regular medical check-ups and centralized medical treatment for all Project workers (directly and indirectly employed) will be provided.
- Non-omani Project workers will receive cultural sensitivity training addressing local norms and customs, including those related to gender.
- The EPC Contractor will regularly monitor interactions between the community and workers both in public spaces and in private spaces, where vulnerable people have the greatest potential for abuse, especially young women.

The Workers Management Plan will include the following measures applicable to the operations phase:

- Conduct pre-employment screening protocols for operation and maintenance workers including contractors and subcontractors which will include testing for communicable diseases of concern

- Provision of awareness training about transmission routes and methods of prevention of communicable diseases of concern as well as early symptoms of such diseases. Training will be provided during induction, and at least every two years, or more often if the WHO Pandemic Alert Scale reaches Level 4.
- The same requirements of communication to and acknowledgment from Project workers about the Workforce CoC will be applied during the operation phase, including directly employed and subcontracted workers (see measures proposed to mitigate this risk during the construction phase).

The WMP (including workers accommodation) will consider the following elements:

- No employee or job applicant will be discriminated against on the basis of their gender, sexual orientation, gender identity, origin, age, disability, marital status, nationality, religion, affiliation to political or union organization;
- As part of their induction, all workers will be provided with sufficient and adequate information on their rights under Omani labour and social security legislation and Company Standards;
- All workers (including those of contractors and subcontractors) should enjoy working conditions that allow them to exercise freedom of association and collective bargaining;
- All workers (including those of contractors and subcontractors) will be provided with written contracts which clearly state the terms and conditions of their employment. Contracts will be verbally explained to all workers, in a language they understand, where this is necessary to ensure that workers understand their rights. Contracts must be in place prior to workers leaving their home location stipulating working hours, pay, and other terms of employment;
- Contractual agreements with contractors and suppliers will establish that the Project Proponent will monitor the effective implementation of the WMP and that it reserves the right to audit working conditions at the workplace, as well as the consequences for breaching national legal requirements, international standards, Company policies, or contractual clauses. Contractual agreements with contractors and suppliers will establish that the same standards will be applied to subcontractors.
- Supplier qualification, assessment, onboarding, and monitoring will take into consideration performance with regard to worker management, worker rights, health and safety;
- Ensure adequate oversight to comply with applicable legislation and international standards on young workers below the age of 18 and under-age child workers;
- Review and monitor the outcomes of community engagement, media coverage and its workforce and community grievance mechanism for additional indications of labour-related issues that may be arising;
- Develop a Human Resources Policy outlining the Company’s approach to managing workers consistent with the requirements of IFC Performance Standard 2. Require contractors and suppliers to put in place policies in line with national legislation and international regulations; and
- The development of the Workers Management Plan should be informed by the findings and recommendations of the Human Rights Risk Assessment and considering the sensitivities of migrant and expatriate workers in Oman to better understand labour welfare and associated social risks.

Furthermore, the project will implement comprehensive training for all personnel, including construction and O&M staff, with specific programs for subcontractors. Key measures include:

- All workforce members, including subcontractors, will undergo induction training covering project specifics, environmental, health, safety, and social responsibilities. This includes familiarization with the applicable regulatory requirements, and internal processes for incident and emergency response.
- Ongoing toolbox talks and tailored training sessions will address specific site activities, potential environmental hazards, and key occupational health and safety topics. These sessions will also cover the importance of safe work practices, appropriate behavior, and adherence to environmental controls.
- Subcontractors must establish and deliver training programs for their teams, which will be subject to approval and audit to ensure adequacy and compliance. These programs must ensure that all personnel are trained, competent, and aware of their responsibilities.
- Training will be customized for different work areas (e.g., waste management), and will include topics such as environmental hazard avoidance, proper waste disposal, and adherence to site-specific protocols. A competent trainer will deliver engaging, audience-specific content, with regular refreshers to address changes in site conditions or activities.
- Training will include cultural awareness to prevent conflicts with local communities, promote respectful behavior, and reinforce the importance of following internal grievance procedures and worker welfare policies.
- The EPC Contractor and subcontractors to provide induction training and toolbox talks relating to the Change Find Procedure during early works and whenever deemed necessary.
- Attendance sheets for all training sessions will be maintained, recording the details of the training, facilitator, and participants to ensure accountability and track training completion.
- The training programme should cover technical matters relevant to the job to be performed, general and job-specific occupational health and safety matters, as well as policies on the expected behaviour at the workplace and when in contact with members of the community.
- Track implementation of training plan and review it according to emerging concerns related to or that might impact the Project.

8.5.12 WORKER GRIEVANCE MECHANISM

A Worker Grievance Mechanism (WGM) will be developed:

- The Project Proponent will design and implement grievance procedures and will require the EPC contractor to implement a WGM that will be accessible to all workers, whether permanent or temporary, directly or indirectly employed.
- The Grievance Mechanism should be:[9]
    - Legitimate: should be a clear, transparent and equitable process that is designed and implemented in accordance with the effectiveness principles, and which should encourage trust.
    - Accessible: the procedures for using a WGM should be kept as simple as possible, avoiding unnecessary administrative stages. All workers should be informed about the

[9] Adapted from IPECA Worker Grievance Mechanisms: Guidance document for the oil and gas industry.

grievance channels available to them, how they can be accessed, and the grievance management process.

- Predictable: management should provide a clear and known procedure for using the WGM, together with an indicative time frame for each stage of grievance management.
- Equitable: workers and management should have reasonable access to sources of information, advice and expertise necessary to engage in a grievance process on fair and informed terms. Where there are language barriers, it may be necessary to provide written materials in different languages and to engage interpreters.
- Transparent: every complaint should be treated seriously, and dealt with consistently and in an impartial, confidential and transparent manner. This builds the credibility of the mechanism among workers and ensures that it will be used.
- Rights-compatible: outcomes and remedies should be in line with internationally-recognized human rights legislation, Company Standards and national law.
- Based on engagement and dialogue with stakeholders: engaging with workers on the design and performance of a grievance mechanism can help to confirm that it meets their needs, that they will use it in practice, and that there is a shared interest in its success.

- TTE/OQAE worker grievance mechanism shall be open to contractor and subcontractor workforce in the event that the Project grievance mechanism fails to adequately resolve worker grievances. by their direct employer. TTE/OQAE will then have the authority to act to resolve this grievance.
- The Project Stakeholder Engagement Plan will be regularly updated and will include continuous engagement throughout the Project lifecycle with worker representatives and/or unions representing Project workers.

8.5.13 OCCUPATIONAL HEALTH AND SAFETY PLAN

The Occupational Health and Safety Plan (OHSP) will be developed to protect workers against adverse health and safety risks, providing measures and actions to be implemented to avoid or mitigate potential adverse. Occupational Health and Safety impacts that may arise from project-related activities, such as potential injuries or accidents.

The OHSP shall comply with the minimum requirements set out in the Ministerial Decision 286/2008 and will be part of a Health and Safety Management System enacted by TTE. This management system will be enforced throughout the Project including all contractors and sub-contractors. It will include aspects such as regular training and monitoring.

An effective OHSP will support TTE/OQAE and Contractors in:

- Avoiding or minimizing risk to and impacts on the OHS of employees and contractor's employees working in the project.
- Defining measures to manage OHS risks to employees and contractors' employees.
- Ensuring compliance with national legislation and international good practices.

The Occupational Health and Safety (OHS) Plan will be part of a Health and Safety Management System (HSMS). The OHS Plan will comply with the requirements of the Ministerial Decision No. 286/2008 approving the Regulation on Occupational Safety and Health

for Establishments. In line with the World Bank Environmental, Health and Safety Guidelines for Electric Power Transmission and Distribution, a Hazard Identification and Risk Assessment will be developed in order to inform the HSMS. This management system will be enforced throughout the Project and will be applicable to all Project personnel (including direct hire employees, advisors and consultants, contractors and sub-contractor personnel). It will include aspects such as OHS competency and training, emergency preparedness, learning from events, monitoring, audit and inspection, and performance improvement. The following measures will be included:

- Assessment of the potential for injury or risk of accident and considering prevailing environmental conditions at the site location, including the potential for extreme natural hazards. All employees will be empowered to stop any works if adequate systems to control risks are not in place.
- Verification of results of the risk assessments with respect to potential hazards, aspects and impacts, and whether the necessary control measures are implemented.
- Prohibition of use of incident-inducing substances (alcohol, drug or any substance which might alter worker behavior) at the Project site and any other location where the work is being performed, while driving a vehicle, and at the project accommodation facilities. Removal of any worker under the influence of such substances from the site.
- Ensure that contractor's and subcontractors' personnel declare the use of any medication to the health professional at the site. The use of medications that may impair performance of the work must be reported to take appropriate measures to reduce risks.
- Implement a program to provide information on incident-inducing substances and ways to prevent their addiction.
- Adapt working time of personnel to climate, environmental, social/religious and living conditions, and ensure that working hours and rotation period duration are as per national regulation.
- Ensure that contractor and subcontractors' medical fitness systems comply with "Fitness to Work Guidance for Company and Contractor Health, HSE and HR professionals''(OGP / IPIECA Guideline 2011).
- Implement a surveillance program to determine medical fitness of workers, including pre-employment medical check-up specific to its job position and once a year (as a minimum) a regular approved medical check-up suitable to their work conditions and to the risks associated with their positions. Ensure the provision of medical assistance for all workers.
- Maintain procedures to ensure that contractor's and subcontractors' personnel are competent to perform their duties in a safe manner and in compliance with the contractor HSE plan, and to increase this competence through appropriate training for contractor's and subcontractors' personnel.
- Implement required trainings as per local laws and regulations, OPAL training standards applicable international standards (e.g. OSHA).
- Consideration of tendering companies' OHS performance and ongoing assessment of such performance. Inclusion of contractual clauses on supplier agreements about the consequences of breaching national legal requirements, international standards, TTE/OAQE Health and Safety requirements.
- Contractors should be required to apply the same standards to their sub-contractors and suppliers.

- Workers and sub-contractors will be provided with the means to ensure compliance such as information, instruction and training, work equipment and personal protective equipment (PPE). Training includes identification of potential hazards to workers, particularly those that may be life-threatening, as well as training in preventative and protective measures, including modification, substitution, or elimination of hazardous conditions or substances.
- Ensure the provision of adequate welfare facilities that satisfies the requirements set out in Ministerial Decision No. 286/2008 and Oman Society for Petroleum Services (OPAL) standards as a minimum requirement in the work site location.
- Workers' accommodation and temporary camps, where relevant, will be provided in line with IFC Performance Standard 2 and the guidance note on 'Workers' accommodation processes and standards' by the IFC and the European Bank for Reconstruction and Development.
- Ensure uninterrupted availability of equipment (including external defibrillators), facilities, medical emergency response, medical care, appropriate communication, appropriate communication and evacuation means for the contractor's and subcontractor's personnel. Such provisions will be established at worksites prior to the start of any mobilization of the workforce. Any appointed contractors will establish their own Emergency Prevention and Response Plan and communicate key information to the Project workforce prior to work commencing on any site.
- A formal Permit to Work (PTW) system will be developed for the facilities. The PTW will ensure that all potentially hazardous work is carried out safely and ensures effective authorization of designated work, effective communication of the work to be carried out, including hazards involved, and safe isolation procedures to be followed before commencing work. A lockout/tagout procedure for equipment will be implemented to ensure that all equipment is isolated from energy sources prior to maintenance or removal.

8.5.14 COMMUNITY HEALTH AND SAFETY MANAGEMENT PLAN

Worker-community interactions and increased pressure on health resources may expose communities to risks and impacts arising from temporary or permanent changes in population.

The objectives of the Community Health and Safety Management Plan (CHMP) will be to outline potential impacts and describe how these should be avoided, mitigated, managed and monitored.

The specific objectives of the CHMP are the following:

- To establish effective mechanisms for protecting the health and safety of nearby communities from any Project-related health risks;
- To undertake a health facilities capacity/needs assessment;
- To assign roles and responsibilities for all actions;
- To define documentation, and monitoring procedures;
- To determine timescales for implementation; and
- To establish a schedule for periodic review and update of the plan.

The plan will inform the ERP (see Section 8.5.15) with respect to viable scenarios in case of industrial emergencies. This assessment will be conducted prior to start of construction

activities in order to gain a better understanding of the adequacy of health facilities to address industrial emergencies during Project operations.

8.5.15 EMERGENCY RESPONSE PLAN

The Emergency Preparedness and Response Plan (ERP) will provide guidelines related to emergency management and response which can be deployed by TTE when a significant incident or accident has occurred, or is likely to occur, during project operations.

The ERP details the processes and resources that may be utilized in response to reasonably foreseeable emergency situations. It also defines the location and composition of the emergency response facilities (defined as part of the Community Health and Safety Management Plan, see 8.5.14). It will cover unexpected events likely to endanger the health of employees, visitors and/or contractors; threaten the environment; or create a risk for the integrity of the installations. The document includes:

- basic principles – general organisation, alert procedure, emergency organisation, liaison between different entities during a crisis, medevac procedure, media management, next of kin information, telephone calls management, and briefing and updates
- roles and responsibilities
- specific scenarios and emergency responses – fire/explosion, illness/casualty/ death, road traffic incident, oil/chemical spill, gas release, loss/ damage to radioactive source, , mass casualty incident, earthquake, terrorism threat and refugees boarding
- forms for recording incidents
- management – training and exercises, update of the plan
- layout and data – charts, maps, layout of facilities, distances between facilities, MSDS
- resources – communication directory, internal emergency resources inventory, external emergency resources inventory.

8.5.16 DECOMMISSIONING MANAGEMENT PLAN

TTE/OQAE will develop a Decommissioning Management Plan (DMP) which will describe how all project assets which have reached the end of their useful life span, shall be decommissioned and either dismantled and removed. The objective of developing this plan is to return the sites to as close to their former state as possible.

The plan will be produced in accordance with statutory requirements and best industry practices.

The Decommissioning Management Plan will include at a minimum: risk assessments, detailed use of resources and environmental interferences (including land, water, wastes, etc), environmental impacts, medical aspects, waste destinations, transportation issues, methodologies, restoration and landscaping, legislative issues and monitoring methodology for assurance of correct abandonment procedures. The Decommissioning Plan will be applicable to all phases of the project including construction activities.

8.6 CONTRACTOR PLANS AND PROCEDURES

The ESMMs described in Section 8.5 provided the basis for subsequent, more detailed management plans prepared by TTE’s key contractors.

Contractors will be required to have their own HSE management systems. Examples of environmental and social related plans/procedures required from the key contractors are listed below.

- HSE plan;
- Waste management plan;
- Hazardous materials management plan;
- Traffic Management Plan;
- Grievance Mechanism;
- Stakeholder Engagement Plan;
- Workers' Management Plan.

In addition, the Contractors will be required to put in place their own Environmental and Social Monitoring Program (see Section 8.6). The specific items to be monitored by the Contractor will be defined between TTE and the Contractor at the tendering phase stage.

The EPC contractor will be required to apply TTE/OAQE Health, Safety, Social, Security and Environmental requirements during all phases of the work.

Regarding impacts on traffic, the Contractor will need to comply with all statutory vehicle limits (width, height, loading, gross weight) and any other statutory requirement. It shall establish and implement standards addressing the following:

- Driver fitness standards, including mandatory rest periods and prohibition of drug/alcohol use.
- In-vehicle monitoring systems to monitor vehicle speed and location (Project vehicles and contractors).
- Project and contractor standards for vehicle safety and maintenance.
- Security response for vehicle incidents.
- Load stability standards.

The Contractor's procedures shall specifically cover arrangements for the following important aspects:

- The source of and number of qualified drivers required.
- Training and approval requirements for drivers.
- Hours of driving and rest periods.
- Security arrangements for drivers, vehicles and loads.
- Arrangements for driver communication with control points and vehicle equipment.
- Language/communication issues.
- The source of suitable vehicles (e.g. quality and specification).
- The number of vehicles required.
- The programme for preventative vehicle maintenance.
- Vehicle routes, route planning and alternative routes.
- Overall vehicle movements.
- Procedures for the emergency recovery of vehicles.
- An appraisal of the socioeconomic impacts of vehicles in the local community.

- Procedures for spot checks and audits of the transport system and for reporting problems.

The contractor will be required to undertake regular inspections to ensure adherence to the TMP.

8.7 PLANNING AND IMPLEMENTATION

8.7.1 TRAINING AND AWARENESS

TTE will identify, plan, monitor, and record training needs for personnel whose work may have a significant adverse impact upon the environment or social/health conditions. The project recognizes that it is important that employees at each relevant function and level are aware of the project's environmental and social/health policy; potential impacts of their activities; and roles and responsibilities in achieving conformance with the policy and procedures.

Training and awareness (raising) therefore forms a key element of both EHS/operational control and the expediting of this framework ESMM. Key staff will, therefore, be appropriately trained in key areas of EHS management and operational control with core skills and competencies being validated on an on-going basis.

The identification of training and awareness requirements and expediting of the identified training/awareness events will be the responsibility of the TTE/OQAE Human Resources Manager.

The HSE Manager, in cooperation with the Department Managers, shall coordinate people to attend their designated HSE training and monitor attendance in the HSE Training Matrix. As part of the training all employees shall be made aware of:

- The importance of conformity with the HSE Guidelines, Protocols, Standards, Procedures & the requirements of the Project ESMMP;
- The significant HSE hazards & associated risks and potential impacts associated with their work, and the HSE benefits of improved personal performance;
- Their roles & responsibilities in achieving conformity with the requirements of the Project ESMMP; and
- The potential consequences of departure from specified procedures.

Specific knowledge or skill gaps that are identified for any person through the application of the competency assessment process can be met through either formal training or structured learning & development in the workplace. Training to close competency deficiencies may be coordinated by the HR Department or by the respective Department (e.g., on-the-job training).

Subcontractors engaged during the pre-Operations phase of the development will be responsible for the training and awareness of their staff. As a minimum it is expected that this will cover the environmental and social setting within which the work is carried out; the potential environmental and social impacts of their work activities; the management and mitigation measures to address these; and the existence of, and importance of complying with, the North Oman Solar PV ESMMP.

8.7.2 COMMUNICATION

TTE/OQAE will maintain a formal procedure for communications with the relevant authorities through its Stakeholder Engagement Plan (SEP).

The HSE Manager is responsible for communication of EHS issues to and from relevant authorities. This is coordinated with the project's Communications and External Relations Manager. The General Manager will be kept informed of such communications. Pertinent information arising from such interactions will be communicated to subcontractors through the EHS Manager.

Whereas it is anticipated that the subcontractor EHS staff may interact with representatives from regulatory authorities on an informal, day-to-day basis regarding routine matters, the HSE Manager shall be the point of contact for formal communications. The HSE Manager will be responsible for communicating any pertinent information arising from such discussions to appropriate subcontractor through the technical department.

Internal communication is used to ensure that all persons are aware of the:

- HSE risks posed by their work activities & the controls to minimize these risks;
- Emergency response procedures that are in place; and
- Lateral learning points arising from incident investigations.

TTE/OQAE uses several mechanisms to communicate to employees, recognizing at all times the possible cultural differences that exist. These include meetings, workshops, forums, presentations, phone, e-mail, and noticeboards.

The Company will hold several regular meetings that relate to the implementation and functioning of the Project ESMMP. The highest-level forum in the Company dedicated to HSE issues is the HSE Steering Committee. The aims of the HSE SC are to:

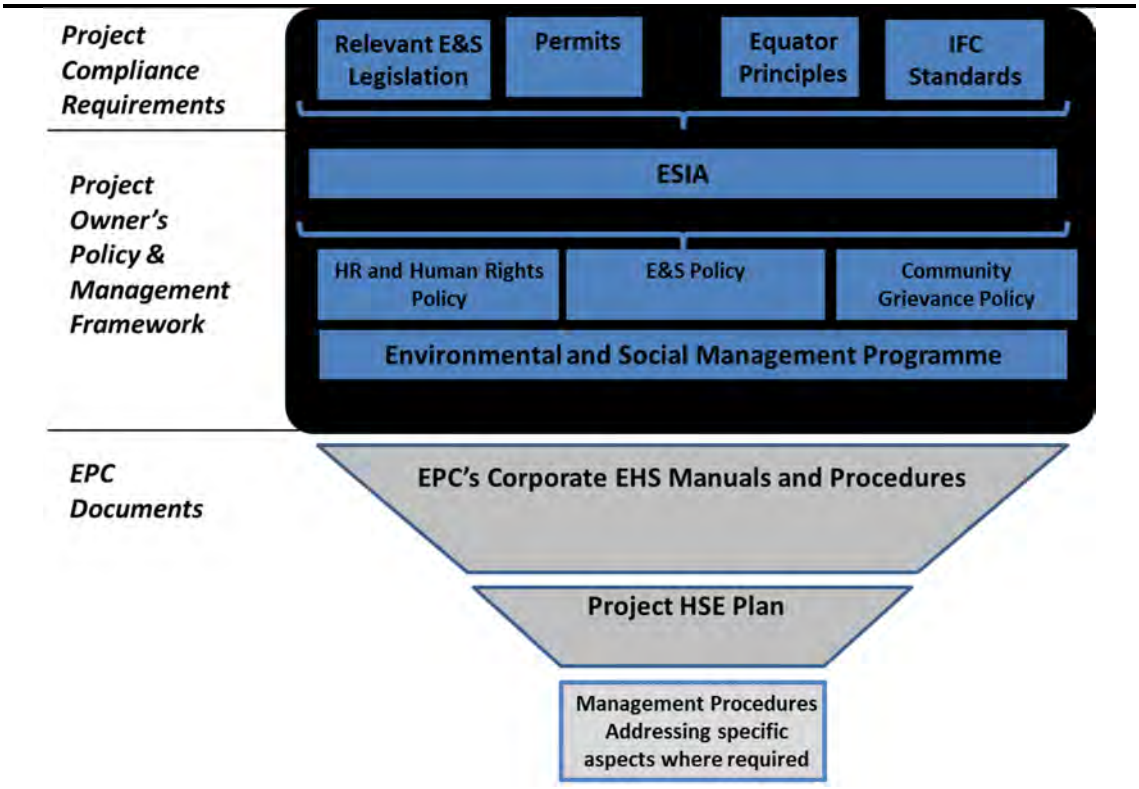
- Monitor execution of the EPC HSE Plan;
- Monitor progress towards the HSE objectives and annual performance targets;
- Ensure appropriate resources are available to implement the HSE Plan; and
- Review incident investigations.

8.7.3 DOCUMENTATION & DOCUMENT CONTROL

TTE/OQAE will control HSE documentation, including management plans; associated procedures; and checklists, forms and reports, through a formal procedure. This document control procedure describes the processes that the project will employ for official communication of both hardcopy and electronic documents. In addition, it describes the requirement for electronic filing and posting and for assignment of a document tracking and control numbers (including revision codes).

The documents determined by the Company as necessary to ensure the effective planning, operation and control of the processes that relate to the Company's significant HSE risks are listed in the HSE MS Document List and are organized in line with the hierarchical structure shown in Figure 8.3.

FIGURE 8.3 HSE MS DOCUMENTATION HIERARCHY FOR THE PROJECT



During operations, the HSE Manager will be responsible for maintaining a master listing of applicable EHS documents and making sure that this list is communicated to the appropriate parties. The EHS Manager will be responsible for providing notice to the affected parties of changes or revisions to documents, for issuing revised copies and for checking that the information is communicated within that party's organization appropriately.

Subcontractors will be required to develop a system for maintaining and controlling their own EHS documentation and describe these systems in their respective EHS plans.

8.7.4 OPERATIONAL CONTROL

Each potentially significant impact identified in the ESIA will have an operational control associated with it that specifies appropriate procedures, work instructions, best management practices, roles, responsibilities, authorities, monitoring, measurement and record keeping for avoiding or reducing impacts.

It is the responsibility of the Department Managers to develop and implement operational control documents (e.g., Operating Manuals & Procedures). These should always be in place for HSE Critical Activities. It is also important that Procedures include measures aimed at improving HSE performance or managing HSE risk, in addition to controlling activities and tasks.

It is the responsibility of Contractors to develop and implement operational & activity control documents (i.e., Standards, Procedures & Work Instructions) for all HSE-Critical Activities which they undertake on behalf of the Company. Where relevant, these Procedures must, as a minimum, meet the performance criteria defined in TTE's HSE Standards.

8.8 IMPLEMENTATION AND MONITORING

Continual examination by TTE/OQAE of the performance of the ESMMP as well as actual performance against HSE targets, are necessary to gauge whether progress is being made towards the strategic HSE objectives of the Company. Full implementation of the ESMMP means that people are doing as directed by the Management System at all levels.

In order to comply with Good International Industry Practice (GIIP) and TTE HSE policy, effective implementation involves:

- Setting performance targets and key performance indicators (KPIs);
- Monitoring to measure performance against targets;
- Keeping performance monitoring records;
- Addressing non-compliance & ensuring that corrective action is taken; and
- Reacting to incidents to make sure that they are reported & investigated.

8.8.1 MONITORING & MEASUREMENT

Monitoring will be conducted to ensure compliance with regulatory requirements as well as to evaluate the effectiveness of operational controls and other measures intended to mitigate potential impacts.

With respect to the impacts identified in the ESIA, TTE/OQAE will develop a number of programs to monitor the effectiveness of the mitigation measures (Section 8.4). The Environmental and Social Management and monitoring plans have been defined in Section 8.7 and will describe what effect is to be measured and the frequency.

The monitoring programs shall:

- Identify the information to be obtained;
- Define the required accuracy of the results;
- Specify the monitoring methods and identify monitoring locations;
- Specify the frequency of measurement; and
- Define roles and responsibilities for monitoring.

8.8.2 REPORTING

Throughout the project, TTE/OQAE will keep regulatory authorities, lenders and other relevant stakeholders informed of the project performance with respect to HSE matters. In order to comply with Good International Industry Practice (GIIP) and TTE/OQAE HSE policy, TTE will release corporate annual reports on environmental and social performance which will be available to the public via the Project's website. The content will be determined with consideration of the environmental permit delivered by EA (where the Omani's reporting obligations are specified), national requirements and lender requirements.

8.9 COMPLIANCE EVALUATIONS AND AUDITS

Identifying potential impacts, hazards and risks is an important part of the ESMMP. Equally important is the investigation of 'near miss' or accidents/incidents so that valuable lessons and information can be learnt and used to prevent similar or more serious occurrences in the future.

TTE/OQAE shall require all contractors to operate in accordance with the established Project Standards (see Section 2) and evaluate compliance with these standards periodically. The evaluation shall be documented and the EPC is required to take action to respond to any non-compliances that are identified.

Non-compliance may be sudden and temporary or it may persist for long periods. It may result from deficiencies or gaps in the ESMMP itself, failures in plant or equipment, or from human error. Non-compliance can be reported directly by those in control of activities or found through inspections and audits of activities.

Investigations should fully establish the root causes including failures in the ESMMP. Investigations enable the planning of corrective action including measures for:

- Restoring compliance as quickly as possible;
- Preventing any recurrence;
- Evaluating and mitigating any resultant adverse HSE effects; and
- Assessing the effectiveness of the above measures.

TTE/OQAE shall also require the contractor to audit the effectiveness of their own EHS Management Systems at periodic intervals, using established and appropriate audit processes, to verify that the system aligns with Project standards, has been properly implemented and maintained, and is effective in meeting the policies and objectives that TTE/OQAE has defined for the Project with the EPC.

Records of the audit will be provided to TTE/OQAE. The EPC shall establish inspection and auditing procedures aligning with TTE requirement.

With respect to communities and social management, TTE/OQAE will carry out regular reviews to assess the extent to which E&S management and community relations at the Project align with Project policies, strategic objectives and commitments.

The following EA Permit Condition will be taken into consideration regarding Audits (EA, July 2024):

- The Company must appoint a registered environmental consultant to conduct a review and audit of the project every three years after operation or when environmental issues arise, and submit the findings to the Authority for evaluation.

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APPENDIX A SCOPING REPORT AND RELATED DOCUMENTATION

المحيطات الخمسة لخدمات البيئة ش م م
Five Oceans
Environmental Services LLC.

SCOPING REPORT FOR SOLAR PHOTOVOLTAIC PLANT IN QARN AL ALAM

M18005 OQ Scoping Study for Qarn Al Alam Solar PV Plant

FEBRUARY 2024

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المحيطات الخمسة لخدمات البيئة ش م م
Five Oceans
Environmental Services LLC.

Scoping Report for Solar Photovoltaic Plant in Qarn Al Alam, Sultanate of Oman

F E B R U A R Y 2 0 2 4

M18005 OQ Scoping Study for Qarn Al Alam Solar PV Plant

Prepared for:

OQ

EXECUTIVE SUMMARY

OQ's Alternative Energy (AE) business unit ("OQAE") is proposing to develop, under the formation of a new special purpose vehicle (SPV) company (currently unnamed but referenced as the 'Project Developer' in this report), a utility scale (105 MWac) solar photovoltaic (PV) plant adjacent to the Qarn Alam Airport in the governorate of Al Dakhiliyah. OQ's Alternative Energy (AE) business unit is the cornerstone of OQ's position as a leading sustainable integrated energy company and a new avenue for sustained, long-term growth. It also has a broad scope across full alternative energy landscape and is predicated on three pillars: Green Molecules, Energy Assets, as well as Energy Efficiency and Optimisation.

The Project will supply cost effective renewable electricity to the off-taker. At a local level, renewable energy can improve the economic and environmental sustainability of the proposed off-taker. The proposed development is planned to be constructed on a land parcel which is currently under PDO's concession (known as Block 6). This Project is aligned with Oman's Vision 2040 and facilitates Economic Diversification and Private Sector Partnership to develop infrastructure that can compete globally. Qarn Alam is located in central Oman in the northeast of PDO's concession area, south of the Fahud and Yibal clusters and north of the Bahja/Rima clusters, the area of interest is dedicated to subsurface hydrocarbon resource exploration.

This Scoping report is a first step in the Environmental Impact Assessment process and is aligned with the RD 114/ 2001 and MD 107/2023 (repealing 48/2017). It provides an overview of the Project, relevant legislation, baseline environmental condition, and the scope of the EIA study going forward.

Oman experiences some of the highest levels of solar radiation in the world with average daily solar radiation of 6.0- 7.1 kWh/ m^2, compared to about 3.6 kWh/m^2 for parts of the United States and about 2.5 kWh/m^2 for Europe and the United Kingdom. The proposed Project aims to establish a 105-megawatt (MWac) solar photovoltaic (PV) power generation system on a largely pre-developed (and PDO owned) area of land located adjacent to the Qarn Alam Airport. Solar generated electricity will be transported through an underground cable to an off-taker. Pending successful resolution of contractual negotiations and all necessary approvals, construction of the PV plant would be initiated in 2024/2025, with energization (i.e. operation) of the 105MWac solar PV power plant anticipated in 2025/2026.

Exact site layout plans are still to be finalized; however, the construction of the Project will broadly consist of the following activities:

- Installing foundation piles, module mounting structures and affixing PV solar modules, with an earthing system;
- Trenching and installing a combination of low and medium voltage wiring to interconnect the PV system (most cabling will be buried);
- Installing combiner boxes, as well as electrical inverters and transformers to convert and step up the electricity produced; and
- Installing a metrological weather station and SCADA, as well as monitoring systems to monitor the surrounding climatic environs and operational performance of the solar PV power plant

The climatic condition of the project area is typically hot and arid to hyper-arid with low humidity. Ecological conservation areas (IUCN, 2019) are not found within or close to the project site. Groundwater within the Rus Formation is often highly saline and characterised by high sulphate levels derived from its evaporitic lithology. Based on similar projects constructed elsewhere, construction is anticipated to last approximately 6-9 months. The lifetime of the solar power plant is anticipated to be over 25 years. The project site appeared sparsely vegetated with low shrubs including the regionally endemic species *Tetraena qatarensis,* and *Blepharis ciliaris*.

Project Activities and possible interactions that may lead to impacts.

Activity	Potential impact
Site clearance	Use of land, loss of flora, fauna and soil seed bank. permanent land take and effects on landform/landscape
Site preparation and establishment works	Use of land Disruption of soil and sub surface drainage Dust generation permanent land usage Accidental events/ spills/ dropped objects (unplanned).
Installing foundation piles, structures, and fixing Solar PV modules. Monitoring weather stations and systems	Localised air pollution (dust generation) Noise from generators Waste generation (hazardous and non-hazardous
Production Operations	Localised air pollution (dust generation) Nose from generators Waste generation (hazardous and non-hazardous Water and soil contamination Employment and regional economic stimulation
Decommissioning and abandonment	Waste generation (hazardous and non-hazardous Accidental events/releases//spills (unplanned)

Ecological conservation areas as well as species of conservational importance (IUCN, 2019) are typically absent at the Project site. Regionally representative plant species are present (i.e. within the *Acacia-Tetraena – Heliotropium* vegetation unit) and animals comprise rodents, birds, and reptiles. Three reptile species are classified as regionally endemic (i.e. *Pristurus carteri, Pristurus minimus,* and *Pseudoceramodactylus khobarensis*) while three are included on the CITES Appendix II species list (i.e. *Uromastyx aegyptia microlepis, Varanus griseus, and Eryx jayakari* (IUCN, 2019). A number of different species of gerbil may occur as well as jerboas (*Jaculus jaculus*). Published bird surveys at Qarn Alam Asset area reveal an estimate of 96 species, 78 at Qarn Alam and 18 at Saih Rawl.

Impacts associated with heat and thermal radiation from the solar PV power plant, light reflection, electromagnetic radiation (EMR), as well those as on landscape and visual will also be scoped out from further assessment in the EIA report.

Existing infrastructure

Potential flood risks assessment, which are already inherent (i.e. applicable if the Project is developed or not) Established infrastructure outside of the project area Roads and pipelines cross the project area from concessions (Block 60, 10 and 11).

Waste management and disposal facilities (PDO) Any abandoned legacy sites from previous PDO activities Fugitive emissions from well-heads, pipelines, processing and storage equipment

Activities

The Project will supply cost effective renewable electricity 105-megawatt (MWac) using solar power plant to the off taker.

The project will comprise of approximately 180,000 PV modules each with a capacity of 585w that will be connected together to produce the required DC power output

The predicted Project scenario include: Approximately 10-12 production substations and transformers; and one main delivery substation.

The following key specialist studies are proposed to support the EIA.

- Air quality, Noise, vibration and climate change
- Socio-economics and Health
- Cultural heritage and archaeology
- Terrestrial Ecology
- Soil and water quality
- Hydrology/ Flood risk

The hydrogeology and flood risk assessment will be based on desktop literature review only (with provision to identify further investigation should gaps exist in the available

information) while the remaining studies are summarised below with regards to field sampling, observations and/or modelling.

Air Quality, Noise, Vibration & Climate Change- Field investigation

Dust (PM^{10}) concentration will be established using automatic monitoring Noise levels will be sampled for daytime and evening noise during the work week only (i.e. excluding weekends) Greenhouse gas emissions (GHG) arising from diesel usage associated with construction vehicles and equipment (generators) will be estimated using IPCC 2006 emission factors Concurrent measurement of suitable meteorological data (e.g. wind speed, direction) during 24-hour air quality and noise monitoring.

Socio-Economics and Health

Formal meetings with government representatives will be held and documented.

Cultural Heritage and Archaeology

There are no potential cultural artefacts identified during the scoping stage of the project. The Project site has already been largely disturbed by PDO related activities and ecology and archaeology are therefore not present within the site

Terrestrial Ecology

Fauna will be surveyed using incidental observation of tracks, droppings, evidence of feeding, and burrows during walk over surveys, and a review of the available literature will provide the ecological context with respect to flora and fauna distributions and the presence of important habitats (if any) in the project area.

Soil Quality

Surface sediment sampling (0-50 and 100-200 mm) of drift deposits identified from the surface geological maps, all samples will be analysed for metals, basic anions and cations, pH and salinity, TPH (multi or tri-band), cation exchange capacity (to assess potential value for vegetation growth).

As part of the EIA, a framework for environmental management will be prepared. The Environmental Management Plan (EMP) framework will set out the obligations of the Project Proponent, the contractor, and the environmental consultant's scope of work relating to environmental auditing, environmental monitoring, and reporting to the Ministry of Environment and Climate Affairs.

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1 INTRODUCTION

OQ's Alternative Energy (AE) business unit ("OQAE") is proposing to develop, under the formation of a new special purpose vehicle (SPV) company (currently unnamed but referenced as the 'Project Developer' in this report), a utility scale (105 MWac) solar photovoltaic (PV) plant adjacent to the Qarn Alam Airport in the governorate of Al Dakhiliyah Figure 1-1.

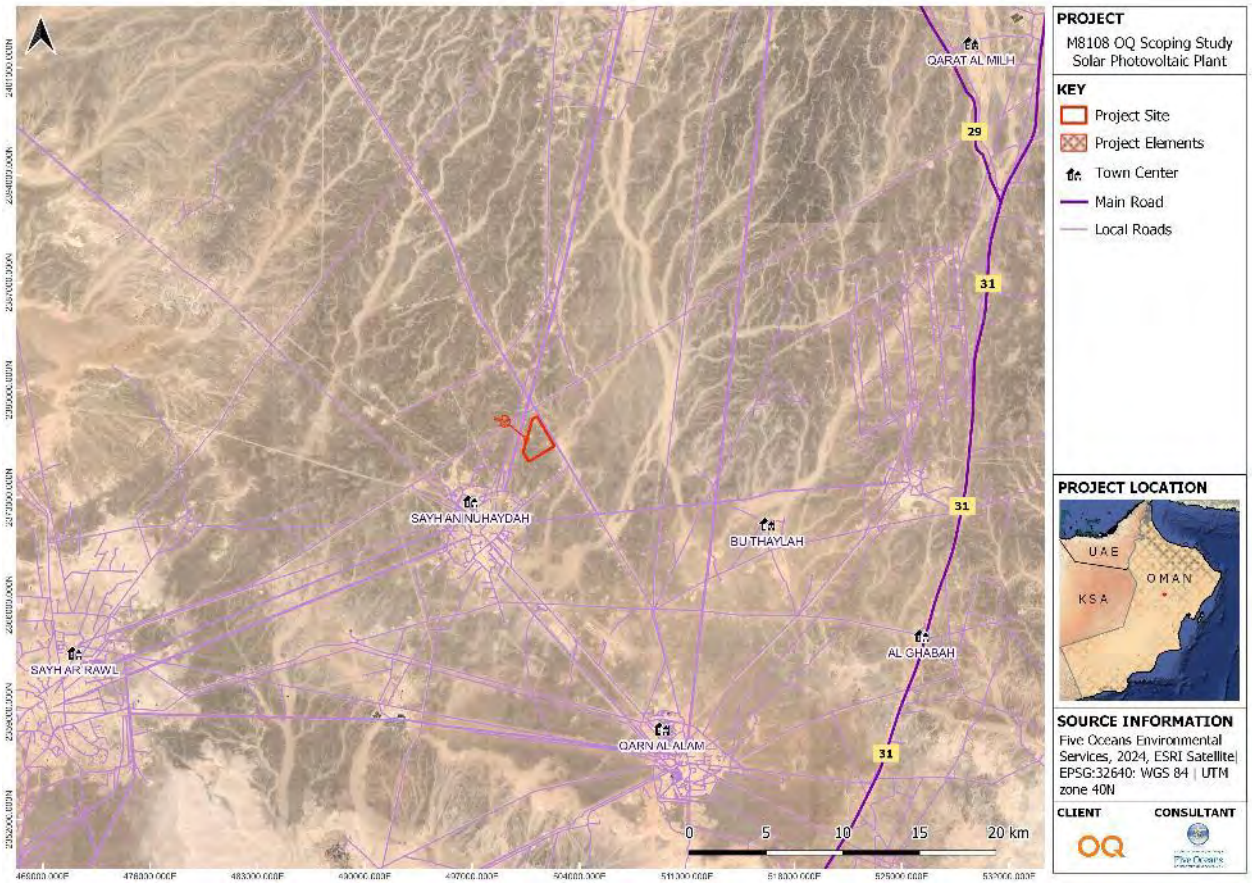

Figure 1-1: Project Location

The proposed development is planned to be constructed on a land parcel which is currently under PDO's concession (known as Block 6). The PV plant will connect directly with an off-taker through an underground electrical cable.

Generated electricity will be captive (i.e. entirely consumed locally rather than fed into the Omani national grid) and an independent power producer licence has been confirmed by the Authority for Electricity Regulation (AER) as not required.

The Project requires permitting by the Environment Authority (EA) through an Environmental Impact Assessment (EIA). Five Oceans (5OES) is an Omani registered

company and has been appointed by the Project Developer to undertake the EIA Scoping study as an independent environmental consultancy.

This Scoping report is a first step in the Environmental Impact Assessment process and is aligned with the RD 114/ 2001 and MD 107/2023 (formerly 48/2017). It provides an overview of the Project, relevant legislation, baseline environmental condition, and the scope of the EIA study going forward. Potential Project impacts are outlined and a scope of work for further study and assessment is described.

1.1 | MOTIVATION

The Project will supply cost effective renewable electricity to the off-taker. At a local level, renewable energy can improve the economic and environmental sustainability of the proposed off-taker. At a national level, while the proposed Project will not be feeding the national grid, it will offset current demand from gas generated electricity. Importantly, the establishment of large-scale utility PV plants is in line with Oman Government's vision to diversify fuel sources for power generation1, and supports the Government's international commitments on climate change to control the growth of greenhouse gas (GHG) emissions2. Renewable energy is recognised as a key tool to achieve the above stated aspirations. Background OQ's Alternative Energy (AE) business unit is the cornerstone of OQ's position as a leading sustainable integrated energy company and a new avenue for sustained, long-term growth. OQ see AE as fundamental to realising their vision of building a locally and globally integrated energy company. OQ's AE have a broad scope across full alternative energy landscape and is predicated on three pillars: Green Molecules, Energy Assets, as well as Energy Efficiency and Optimisation.

Five Oceans is an Omani registered company and it is an EA registered environmental consultancy specialising in environmental management within a range of sectors including renewable energy.

1.2 | BACKGROUND

1 The Government of Oman's aspiration is to have around 2GW of solar power installed by 2024

2 Government of Oman's UN's individually Declared National Contribution (INDC) as part of the Paris Agreement. Oman will control its expected GHG emissions growth by 2% (below BAU) to be 88714 Gg (in 2030) during the period from 2020 – 2030.

OQ's Alternative Energy (AE) business unit is the cornerstone of OQ's position as a leading sustainable integrated energy company and a new avenue for sustained, long-term growth. OQ see AE as fundamental to realising their vision of building a locally and globally integrated energy company. OQ's AE have a broad scope across full alternative energy landscape and is predicated on three pillars: Green Molecules, Energy Assets, as well as Energy Efficiency and Optimisation.

Five Oceans is an Omani registered company and it is an EA registered environmental consultancy specialising in environmental management within a range of sectors including renewable energy. The reader is referred to Appendix A for a company profile of Five Oceans.

1.3 | PROJECT TIMEFRAME

The expected EIA and Project schedule for phase 1 is given in Table 1-1. Construction of phase 2 is planned in 2024/2025, with operation in 2025/2026.

Table 1-1: Indicative Project Schedule (subject to confirmation)

Key Activity*	Estimated Timeline*
EIA submission to EA	2024
Permit decision issued by EA	2024
Start of Construction	2025
Start of Operation	2025/2026

** Note: It is the aspiration of the Project Developer that more renewable plants may be established in the future. However, these details are not yet mature enough to include within the scope of the EIA. The Project Developer therefore proposes to deal with any further potential expansions through an addendum to the EIA or via an entirely new EIA pe*

2 PROJECT DESCRIPTION

2.1 | OVERVIEW

Oman experiences some of the highest levels of solar radiation in the world with average daily solar radiation of 6.0- 7.1 kWh/m2, compared to about 3.6 kWh/m^2 for parts of the United States and about 2.5 kWh/m^2 for Europe and the United Kingdom. The proposed Project aims to establish a 105-megawatt (MWac) solar photovoltaic (PV) power generation system on a largely predeveloped and PDO owned area of land located adjacent to Qarn Alam Airport. Solar generated electricity will be transported through an underground cable to an off-taker. Pending successful resolution of contractual negotiations and all necessary approvals, construction of the PV plant would be initiated in 2024/2025, with energization (i.e. operation) of the 105MWac solar PV power plant anticipated in 2025/2026. Exact site layout plans are still to be finalized; however, the construction of the Project will broadly consist of the following activities:

Installing foundation piles, module mounting structures and affixing PV solar modules, with an earthing system;

Trenching and installing a combination of low voltage and medium voltage wiring to interconnect the PV system (most cabling will be buried);

Installing combiner boxes, as well as electrical inverters and transformers to convert and step up the electricity produced; and installing a metrological weather station and SCADA, as well as monitoring systems to monitor the surrounding climatic environs and operational performance of the solar PV power plant.

Below Figure, illustrates the Solar PV layout overlaid on satellite image of proposed site (illustrating surrounding disturbed area).

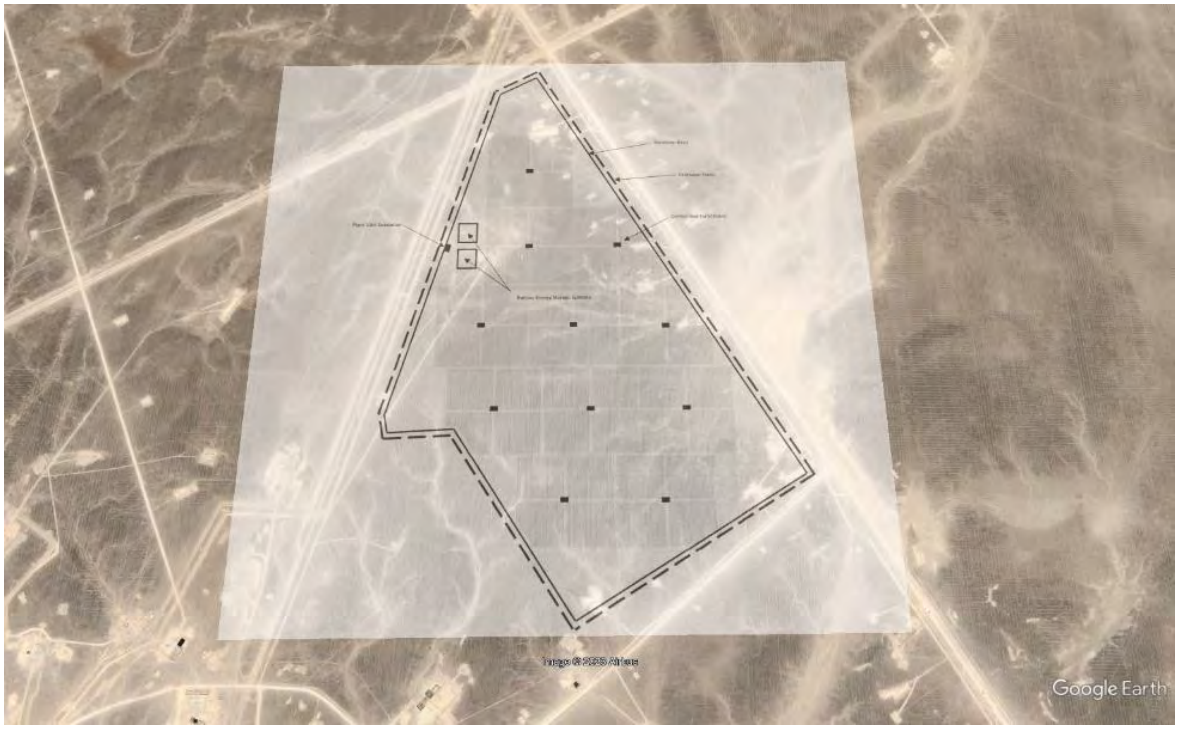

Figure 2-1: Solar PV layout overlaid on satellite image of proposed site (illustrating surrounding disturbed area)

2.2 | FOUNDATIONS AND MODULE MOUNTING (OR TRACKING) SYSTEMS

To mount the PV modules, approximately ~100 000 galvanized steel foundational piles will be either screwed or pile driven into the subsurface of the site to a depth of around 2-3 m. Galvanized mounting structures will then be secured onto the piles to provide a base for mounting the PV modules (**Error! Reference source not found.**).

The mounting structures will either be fixed tilt angle or on sun-tracking frames. For fixed mounting structures, the panels are typically fixed and tilted due south (in the northern hemispheres), while single axis tracking systems are aligned in a north-south direction and follow the sun as they move from the eastern to western sky throughout the day. The mounting structures will have a ground cover ratio of ~90% (i.e. panels will roughly cover around 90% of the site area.

The decision to use either a tracked or fixed mounting frame depends on many factors including the solar resource, site condition, market economics, power purchase agreement, etc. The solar PV plant layout will also be optimized to fill most of the available land space in the plot area, while allowing for maintenance road ways and shading/access clearance between and around module tables. As mentioned, the final

layout will be subject to evaluation of technical and commercial tenders by the EPC contractors (currently underway).

2.3 | SOLAR PHOTOVOLTAIC (PV) MODULES:

Solar PV panels or modules are comprised of many small photovoltaic cells which convert energy from the sun. Each PV module is approximately 2 x 1 m long and comprises many PV cells made up of semi-conductive materials, in this case silicon, which enables the sunlight to be converted into direct current (DC) electricity through a photovoltaic effect. The project will comprise of approximately 180,000 PV modules each with a capacity of 585w that will be connected together in 'strings' to produce the required DC power output i.e. 105MWac.

Crystalline bi-facial cells are the most common PV cell technology currently available and are highly efficient. There are two types of crystalline PV cell technology: mono-crystalline silicon (mono-c-Si) and poly (or multi) crystalline silicon (multi-c-Si). For this project Monocrystalline Bifacial cells will be used.

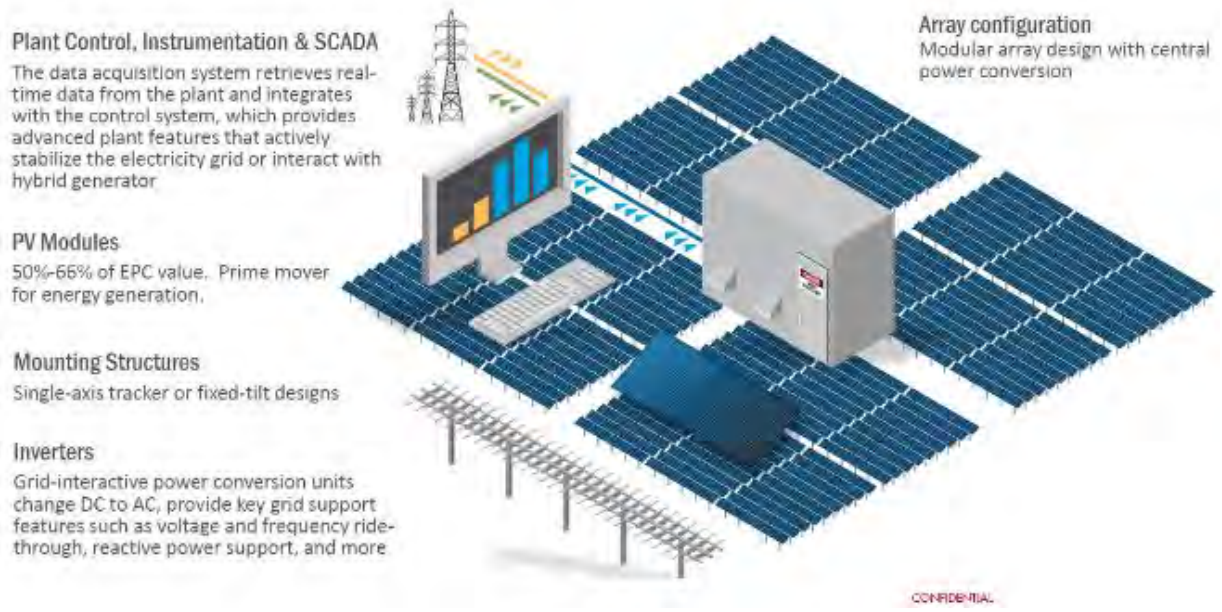

Figure 2-2: Indicative photographs of construction activities (top) with typical solar PV configuration (bottom).

Mono crystalline silicon are thin wafers of silicon cut from a single silicon crystal, while poly-crystalline cells are also thin wafers of silicon cut from multiple crystals as opposed to one, which gives them their recognizable crystal lattice structure. Crystalline cells are comprised of inert materials including silicon (glass), aluminium (frame) and copper (wiring).

Bifacial Monocrystalline PV cell technology is currently being evaluated for the Project, with criteria for selection being driven by similar factors as described above for the mounting system. In designing the final layout of the Project, consideration will also be given to optimization aspects with selection of the final PV module choice and layout such as shading, performance degradation, and consideration of trade-offs between increased investment and energy yield. Solar PV modules do not emit any greenhouse gas emissions or discharges during their operation.

2.4 | INVERTERS

Inverters are required to convert the DC electricity produced by the PV modules into alternating current (AC). Many PV modules in either series strings or parallel strings will be connected to the inverters. Below figures show the solar mounting axis and solar modules installed on tables (Figure 2-3).

Figure 2-3: Photographs showing Solar Mounting single axis (top) and Solar Modules installed on tables (bottom).

2.5 | STEP-UP TRANSFORMERS

The output from the inverters generally requires a step-up in voltage to reach the AC grid voltage level. The step-up transformer takes the output from the inverters to the required grid voltage.

2.6 | BATTERY ENERGY STORAGE SYSTEM (BESS)

The energy storage system of most interest to solar PV producers is the battery energy storage system, or BESS. Energy storage systems capture surplus energy during times of high production/low demand and store it for use during times of low production/high demand. While not a new technology, energy storage is rapidly gaining traction as a way to provide a stable and consistent supply of renewable energy to the grid or off-taker.

While only 2–3% of energy storage systems in the U.S. are BESS (most are still hydro pumps), there is an increasing move to integrate BESS with renewables as battery technology improves.

2.7 | GENERAL CONSTRUCTION ACTIVITIES

Activities associated with the installation of the above equipment are outlined in sections 2.9 - 2.13 |. Additionally, site activities will also involve the following temporary onsite activities and/or requirements over the construction period:

- Minor earthworks to prepare the site (e.g. bulldozers / scrapers will be used to grade the soil for establishment of internal roads and site drainage).
- Establishment of ancillary services (e.g. temporary collection of all greywater and sewage generated from the temporary workforce on site) with disposal of generated wastewaters being transported to an approved municipal facility within PDO's concession (or Beah approved facility) for final treatment and/or disposal. Solid waste management is addressed within 2.15 |.
- Temporary establishment of a water storage tank (for cleaning) which will likely be fed by on site by tanker bowser.
- Temporary storage of diesel on site for vehicles and equipment, with temporary storage tanks sited within bunded areas, in order to avoid any potential for unintended release into the environment.

Based on similar projects constructed elsewhere, construction is anticipated to last approximately 6-9 months. The eventual layout of the Project is subject to final contract negotiations and will be influenced by optimization of the plant design which will take into account: shading, performance degradation, and trade-offs between increased investment (e.g. for tracking) and energy yield. Preparatory earthworks are anticipated (i.e. levelling, temporary flood diversion works, (no vegetation exists on the site). The site has already been (largely) disturbed by PDO use. The life time of the solar power plant is anticipated to be 25 years or more. Minimal onsite operational or maintenance activities will occur once the power plant is operational, anticipated to be largely associated with planned panel washing due to accumulation of dust (planned, approximately one (1) to four (4) times per year) and replacement of failed parts (unplanned, infrequent). Potable

water usage for washing the PV modules is estimated to be in the range of 50-100m^3/annum.

Eventual decommissioning will take ~3-6 months and all Project materials will be removed from site during this period (current solar industry practice is to re-use or recycle >99% of the material). The site will be reinstated to a condition similar to that at the point of transfer (i.e. present condition prior to construction works being undertaken). Detailed assessment of decommissioning will be subject to a separate study closer to the time of decommissioning.

2.8 | PROJECT LOCATION

The proposed Project is located within PDO's block 6 concession area close to PDO's Saih Nihaydah gas depletion compression facility next to Qarn Alam airport in the northern region of Oman, approximately 170 km south west from Nizwa (Figure 2-4).

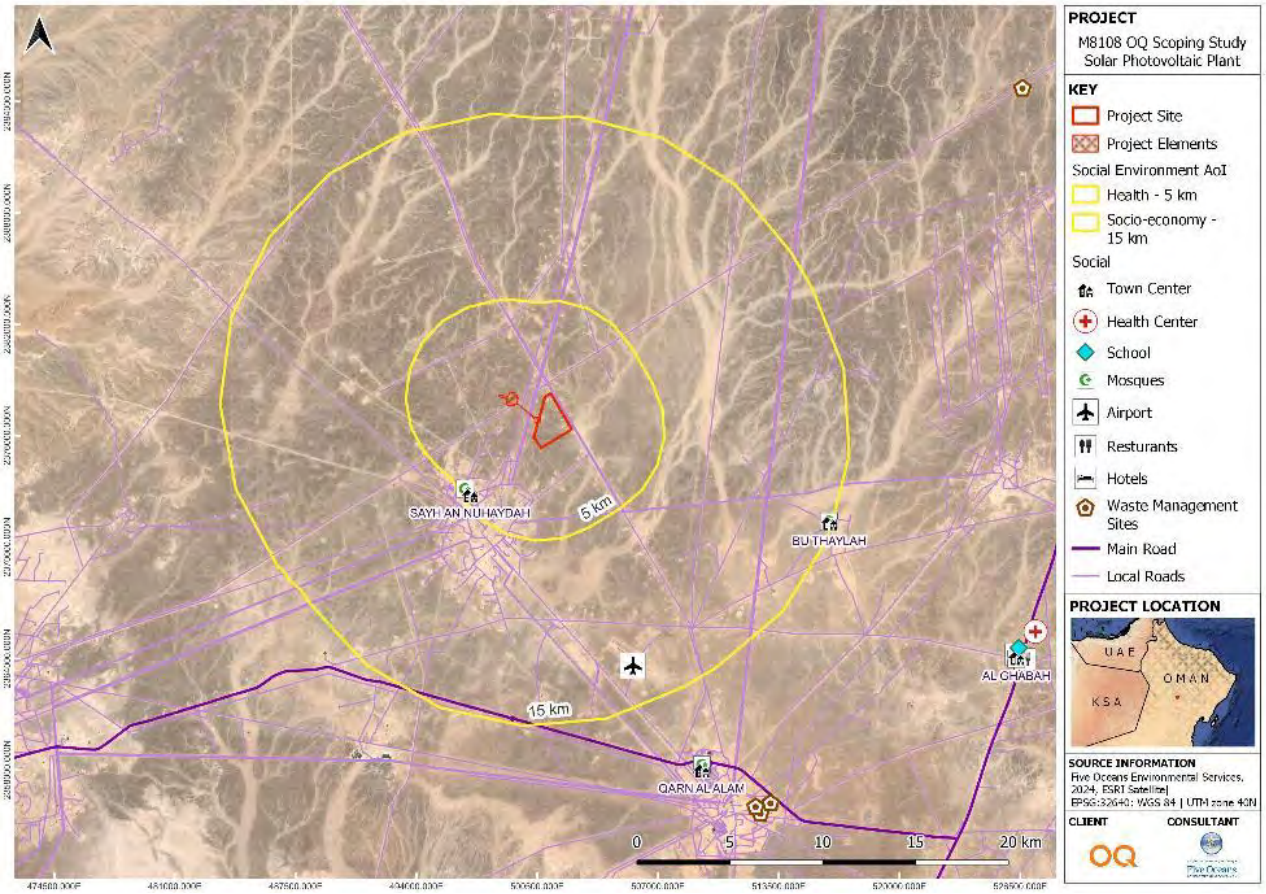

Figure 2-4: Location PV site in national and local context

2.9 | TECHNICAL DESIGN

The proposed technical design of the proposed Project will typically include:

- 25 MW_{ac} PV Plant, utilising 90-95 thousand individual modules depending on the power rating of the individual modules (i.e. ~ 350Wp modules).
- Modules will be mounted on mounting structures forming tables (refer to Figure 2-3, for example).
- The PV Plant layout will be optimised to fill most of the available land space in the plot area, allowing for maintenance road ways and shading/access clearance between and around module tables.
- Individual modules will vary in size depending on design, but will typically be ~198 cm x 100 cm.
- Configuration will depend on detail design and will typically have a leading edge ~80 cm from ground and a trailing edge 2-3 m from ground level.
- Modules will be arranged in 2-3 portrait- or 2-4 landscape- positions or other permutations.

2.10 | BUILDINGS, SUBSTATIONS, AND CONTROL ROOMS

The anticipated Project scenario include:

- Approximately 10-12 production substations and transformers; and
- One main delivery substation.

While topology can change (i.e. fewer but larger inverters and substations) the above scenario involves "buildings of single floor" (shed like) structures with 10 ft order of magnitude shipping containers and up to 20 ft shipping container for large transformer/ inverter topologies. A meteorological station will be maintained on site for the duration of the Project to provide real-time weather data.

2.11 | SITE PREPARATION

The site will be prepared by the chosen EPC contractor. The solar construction may include: in-field gravel roads and trenching for cabling. The solar mounting structure will involve thousands of shallow, 2-3m penetration piles typically of H section galvanised steel or similar. Piles will be driven, screwed, or pre-drilled and driven or cemented into place. Driven piling is most common. A 100 MW_{ac} site will likely have more than 80,000 piles.

2.12 | LOGISTICS

Materials supply will typically arrive via shipping containers, likely brought directly into Duqm or Sohar port or by road from the United Arab Emirates. Materials are anticipated to be temporarily housed in ~250-300 x 40 ft shipping containers. On site vehicles will typically include:

- 4-6 Piling rigs;
- 2-3 Forklift/telehandlers;
- 1-2 ~30 t cranes for temporary lifts;
- 4-6 Pick-up trucks / 4x4's;
- 2-4 Crew mini buses;
- 2-3 Trenching units; and
- 1 Ad hoc cement mixer truck.

Temporary office and canteen units will include 4-8 onsite portacabins for the construction period, whilst no onsite offices are necessary for the operation of the plant a standalone guard room may be provided for security personnel onsite.

2.13 | WORKFORCE

The workforce will typically range from 20-30 personnel (plus 30-40 personnel for 3-6 weeks at a peak time) for 2-3 months. Workers will be typically skilled and may be characterised by ~20% and ~50% Omani nationals during construction and operation respectively.

2.14 | OPERATIONS & MAINTENANCE

Operations & Maintenance (O&M) activities will likely require no permanent staff, other than a security person(s). Maintenance will be via locally based subcontractor with specialist vendors as and when required. Site visits for routine maintenance will be typically monthly, and a small site office will likely be maintained with minimal overall waste generation. The Project Developer intends to select a contractor to engineer, procure and construct the Project ("EPC Contractor''), with the objective of delivering a financeable PV Plant, compliant with Omani regulations, with no safety incidents and minimum operational interference or distraction to the Off-taker. At present, it is proposed that the EPC Contractor will be responsible for the operation and management of the Project to support other Contractor's during the Performance Guarantee period.

2.15 | WASTE

Project waste will typically be solid, non-hazardous, and primarily comprised of packing materials (i.e. wood pallets, metal scrap, and cardboard). The majority of the waste generated (i.e. >95%) will be through the construction period only. All waste (including domestic waste such as sewage and food) will be manged by the approved existing municipal waste system at Sohar (Be'ah). Operational waste will primarily comprise 500 m^3 of runoff wash water (i.e. water used to clean the PV panels, typically twice a year). No additives (e.g. detergent) will be used for washing.

2.16 | PHASES OF THE RENEWABLE ENERGY SITE

The following phases are generally applicable to renewable energy developments:

- Construction phase (including pre-construction phase)
- Operation Phase
- Decommissioning Phase

In the sections below a general overview is giving of the activities during construction phase, operation and decommissioning phases as well as the relevant environmental emissions. Table 2-1 provides a general overview of installation methods during the different phases for wind, solar and transmission line. the final methods may vary from what is presented below and will be dependent on the manufacturers and contractors contracted for the project and site conditions at the time of installation.

Table 2-1: General overview of installation methods

Construction Phase	Operational Phase	Decommissioning Phase
General - Vegetation clearance and levelling - Construction of access roads - Blasting (not anticipated) - Excavation & Filling - Transport of equipment (temporary and permanent) - Transport of materials and waste - Construction camps and offices, which could include temporary storage sites for equipment and materials. Workers will likely not live on site - General equipment and material laydown areas will also be required during the construction phase.	- Maintenance cleaning of PV panels with cleaning robots	- Removal of PV panels and supports - Dismantling of electric circuit including inverters and transformers - Dismantling and removal of substation\ - Rehabilitation of areas HVTL specific - Transfer of assets also to be kept as option where feasible

- Constructing Permanent control room administration/service areas
- Dismantling of laydown areas
- Installation of DC strings & combiner boxes, DC circuits to inverters, inverters, LV circuit to transformers, MV transformers, RMU, MV circuits, MV switchgears at electrical building
- Construction of Substation / Electrical building
- Installation of fencing targeted to a small restricted area around the turbine base (if applicable)

- Installation of PV panels and supports
- Fencing
- Construction of Substation / Electrical building

HVTL specific

- Civil Works for pylon foundations;
- Pylon erection;
- Conductor stringing;
- Compliance quality testing; and
- Substations
- Rehabilitation of disturbed temporary areas.

2.17 | ALTERNATIVES FOR SOLAR AND TRANSMISSION LINE

Alternatives that should be considered include:

- Alternative locations, (including the "do nothing option").
- Variations in site layouts, scales of development and access arrangements
- Alternative technologies/design and alternative phasing of construction
- The ESIA should identify and document the main reasons (including environmental) for the final choice of the preferred alternative and plant variation, which should involve a comparison of the magnitude and significance of the effects of all the alternatives considered.

2.17.1 | NO-ACTION ALTERNATIVE

The ''no-action alternative'' is the future situation without the Project. If the Project did not take place, potentially adverse impacts from the construction and operation of the plant would not occur (such as noise, emissions etc.).

The Project will contribute to the efforts of the National Energy Strategy, which foresees a gradual transition to a low carbon economy and an energy matrix significantly lower in carbon emissions by 2030. The project will help realise the National Energy Strategy ambitions target to derive 20% of electricity from renewables by 2027, i.e., from solar.

However, taking no action would mean that the hydrogen and derivates plant will not be supplied with renewable energy and therefore not contribute to Omani's National Energy Strategy.

2.17.2 | TECHNICAL ALTERNATIVES

The ESIA process will build on the technical concepts still to be developed by OQ and include an analysis of the principal technically and financially feasible alternatives.

2.17.3 | ALTERNATIVE LOCATIONS

There are no alternative locations, in collaboration with PDO this Renewable Energy Area has been designated by OQ/ PDO. The transmission line corridor is also considered the best alternative.

3 PRELIMINARY BASELINE

3.1 | METHODOLOGY OF BASELINE REVIEW

Given the nature of the project the environmental, health and social parameters which should be considered for this report are described in below table.

Table 3-1: Environmental and Social Parameters Considered within the Scoping Phase

Physical Environment	Biological Environment	Social Environment
• Geology, Soils and Land Quality • Surface Hydrology, Groundwater and Water Quality • Coastal Geomorphology, Coastal Processes and Sedimentary Regime • Air Quality and Climate • Light, Noise and Vibrations	• Environmental Designations and Protected Species • Terrestrial Ecology and Ornithology • Critical Habitat Assessment • Ecosystem Services	• Socio- economic • Health • Archaeology and Cultural Heritage • Human Rights • Landscape and visual

The following three steps were conducted in order to collect all relevant primary baseline information on the parameters described in Table 3-1.

3.1.1 | STEP 1: BASELINE DATA COLLECTION

Preliminary data collection: A rapid field visit was conducted from in December 2023. During the site visit, spot locations within the site were visited to obtain a high-level overview of aspects such as Fauna, Flora, Soil, Archaeology, Hydrology, and surrounding land uses.

3.1.2 | STEP 2: REVIEW AND VALIDATION OF EXISTING DATA

The second step was a review and validation of available and relevant existing baseline information. The following type of documents were considered to include information relevant for the Project (all documents used to prepare this report are presented in the reference list): Shell Mabrouk, Upstream exploration and development ESIA; Shell Solar Qabas ESIA, Solar Wadi ESIA, Scientific literature published in Journals, Policy documents published by the Sultanate of Oman, Studies undertaken for engineering works, Single-issue reports by NGO's.

3.1.3 | STEP 3: DETERMINE AREA OF INTEREST

The following factors have been considered when determining the AoI:

- The physical extent of the Project's components (i.e., the solar farm's direct footprint) during construction, operation and decommissioning phases;
- The spatial extent affected by the site (i.e. the AoIs) during construction, operation and decommissioning phases (defined by impacts which are likely to be propagated beyond the Project boundary depending on the nature of the baseline environment).
- The overlap between the site as well as other activities and facilities that are used by, e.g., import of project equipment, materials via the Port of Duqm, use of the workers village, etc.

3.2 | EXISTING KNOWN ENVIRONMENTAL, SOCIAL AND HEALTH BASELINE

In the next sections three AoIs were identified and compiled based on the nature of the Valued Environmental Components (VECs) (included in parenthesis): Each section is divided into the description of the AoI and the accompanied map and a baseline characterisation per topic. The description narrows down from the regional to the local context.

3.3 | PHYSICAL ENVIRONMENT

3.3.1 | AREA OF INFLUENCE

The physical environment has been characterised according to several different aspects including soils and geology, hydrology and hydrogeology, air quality, noise and vibration, climate and climate change. Different Areas of Influence AoIs have been identified for each group of physical environment receptors, depending on their sensitivity and primary characteristics.

3.4 | GEOMORPHOLOGY LANDUSE AND TOPOGRAPHY

Qarn Alam is located in central Oman in the northeast of PDO's concession area, south of the Fahud and Yibal clusters and north of the Bahja/Rima clusters, the area of interest is dedicated to subsurface hydrocarbon resource exploration. Land use is historically and primarily designated to oil and gas operations and their associated infrastructure (i.e. networks of roads and power). There are no subsistence farming or date orchards within the Qarn Alam area where the project site sits within.

Qarn Alam is typical of central Oman topography; comprising of flat, barren gravel plains and small gentle sloped gravel hills with some rocky outcrops. Small drainage channels and wadis are also present amongst small unstable sand dune features. The wadis flow from the northern Hajar Mountains and create alluvial gravel fans within the cluster. One of the major wadis that passes through the wider project area is Wadi Umayri; it drains into a depression northwest of Qarn Alam called Umm as Samim, a large sabkha (salt flat). Other smaller wadis found in the area include Wadi Majhul, Halibah, Thaylah and Qitfah. Vegetation in the area is largely confined to the wadis and drainage channels.

The landscape is characterised by flat plains interspersed with small drainage channels and occasional rocky outcrops. Wadis channels are located to the East of the site. The landscape of the project site has been scarred by vehicle access and excavation

The natural habitats of the surrounding area have been heavily modified by road and oil and gas facilities construction, excavation, vibroseis surveys and livestock grazing giving an overall impression of a modified and degraded habitat condition. Interestingly the creation of artificial habitats such as wetland lagoons, waste disposal sites and irrigated landscape planting in the PDO asset are likely to act as attractants to wildlife which may be potentially impacted by the project.

3.5 | CLIMATE

The region is typically hot and arid to hyper-arid with low humidity (Meteoblue, 2019). Mean maximum daily summer (May-October) temperatures can exceed 44°C while winter (November-April) temperatures can reach minimums of 11°C conditions, however precipitation is inconsistent and limited, usually occurring between March and August. Average wind speed is highest (13km/h) in summer and typically blows from the south east.

Meteorological data recorded in Qarn Alam indicates a mean annual temperature is 28.5°C with a maximum of 47.9°C and a minimum of 7°C absolute temperatures. Temperature is an important factor for this project as most PV panels produce less electricity output when the surrounding temperature rises above 25°C, and the generated voltage is reduced as temperatures continue to increase.

3.6 | TERRESTRIAL ECOLOGY

Hyper arid conditions dominate the region and biodiversity is typically low. As birds and larger terrestrial mammals are highly mobile and potentially impacted by the project the AOI extends to a radius of 25km (Figure 3-1).

The ecological justification for this distance beyond the immediate project site across a broader impact zone includes (i) the recorded presence in the area of highly mobile migratory waterbirds of conservation concern which may be attracted to existing artificial wetlands up to 25km^2 away and impacted by the project and (ii) the home ranges of larger mammal in desert habitats which may extend over a similar distance. The extent of the AOI has been defined at this scoping stage by qualified ecological specialists. The opportunity exists for subsequent refinement during the impact assessment as more baseline information becomes available.

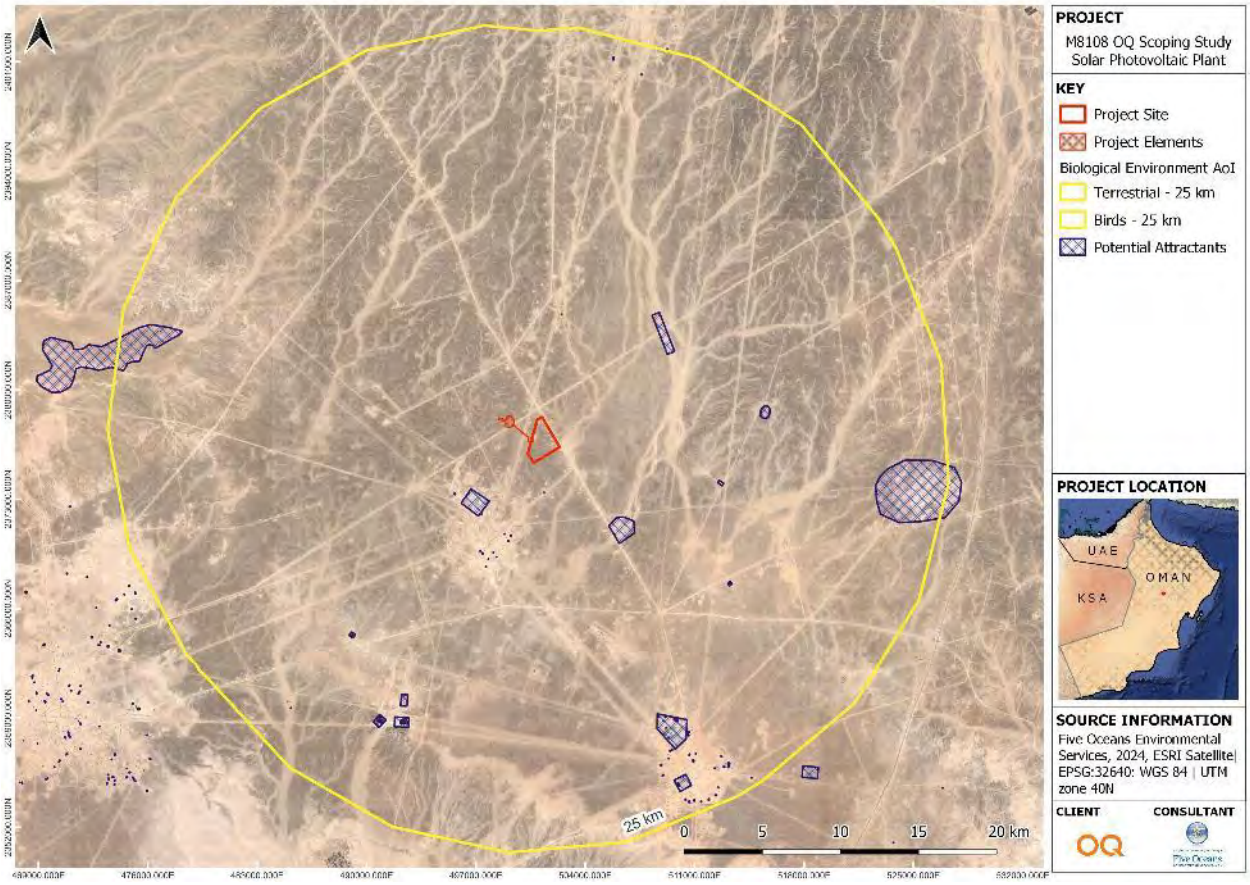

Figure 3-1 Terrestrial ecology AoI

3.6.1 | FLORA

Vegetation of the wider project area is typically classified as the *Acacia*-Tetraena (*formerly Zygophyllum*) – *Heliotropium* vegetation unit (Ghazanfar, 2004) with groundcover dominated by Chenopodiaceae (Goosefoot or Glasswort Family) and *Zygophyllaceae* (Bean Caper or Caltrop Family) (Ghazanfar, 1998b). Low, vegetated mounds (nabkhas) form around *Acacia ehrenbergiana* (Ghazanfar, 1998b), as well as other shrub and tree species. The vegetation of project AOI can be broadly classified as the *Acacia-Zygophyllum-Heliotropium*. The surrounding AOI is more floristically diverse with

scattered tree species *Prospois cineraia, Acacia tortilis* (*Vachellia tortilis*), *Nannorrhops ritchiana* and *Convolvolous virgatus* a common perennial species in gravel plains and wadi beds. During the reconnaissance visit the project site appeared sparsely vegetated with low shrubs including the regionally endemic species *Tetraena qatarensi*s and *Blepharis ciliaris*(Figure 3-2).

Figure 3-2: *Tetraena quatarensis* (left), *Blepharis ciliaris* (right)

3.6.2 | FAUNA

Fauna is limited in the Project area but includes mammals, birds, and herpetofauna.

MAMMALS

Rodents are likely to be reasonably common in the area where vegetation is denser and varied, such as in the extensive *Tetraena qatarensis* and *Seidlitzia rosmarinus* area in the Manal Area located in the south of the Project Area. A number of different species of gerbil may occur as well as jerboas (*Jaculus jaculus*).

Large carnivore populations in Oman are generally fragmented and it is unlikely that wolves (*Canis lupus*), hyaenas (*Hyaena hyaena*) and caracal (*Caracal caracal*) remain within the area (Fisher, 1999) due to disturbance, loss of prey species resulting from hunting, and direct persecution and eradication by humans.

Large mammals likely to occur at the project site and in the AOI include Arabian Red Fox, *Vulpes vulpes arabica*, with the possibility that the Endangered, Mountain gazelle, *Gazella gazella*, and the Vulnerable, Arabian sand gazelle, *Gazella marica*, and other species which qualify under the IUCN world Red List occur in the area and could be impacted by the project through disturbance and the loss of foraging habitat.

BIRDS

A total of 531 bird species are known to occur in Oman, with 19 globally threatened species. Published bird surveys at Qarn Alam Asset area reveal an estimate of 96 species, 78 at Qarn Alam and 18 at Saih Rawl. The majority of the species are migratory with 12 species thought to breed in the area (HMR, 2002).

A total of 41 bird species have been recorded at Ghabba a nearby settlement to the project site (see Map 1) including the Egyptian Vulture, *Neophron percnopterus,* a globally Endangered species recorded and Barn Owl, *Tyto alba* a possible breeding species in the area with a declining population (eBird, 2023, IUCN., 2022).

A total of 7 species were recorded during the reconnaissance on site and in the AOI, including Greater Hoopoe Lark, *Alaemon alaudipes,* Collared dove, *Streptopelia decaocto*, Desert Wheatear, *Oenanthe deserti,* House sparrow, *Passer domesticus,* and Brown-necked Raven *Corvus ruficollis.* Feint tracks of a Sandgrouse species were observed in the sandy areas of the project site but these birds were not seen or heard to allow identification to species level.

Somewhat counterintuitively for an inland desert environment wetland bird species Black-winged Stilt, *Himantopus himantopus* and Common Sandpiper, *Actitis hypoleucos* and Lesser Flamingo were recorded during the reconnaissance visit and in historic records. Black-winged Stilt is a potential opportunistic breeding species in this area while Common sandpipers are passage migrants and winter visitors. These species are attracted to the artificial wetland created in the AOI. Given the possibility that solar PV facilities may be mistaken for waterbodies and attract wetland birds resulting in collision fatalities, the presence of these features must be addressed in the baseline ecology of the ESIA and subsequent post-construction monitoring.

MAMMALS

Rodents are likely to be reasonably common in the area where vegetation is denser and varied, such as in the extensive *Tetraena qatarensis* and *Seidlitzia rosmarinus* area in the Manal Area located in the south of the Project Area. A number of different species of gerbil may occur as well as jerboas (*Jaculus jaculus*).

Large carnivore populations in Oman are generally fragmented and it is unlikely that wolves (*Canis lupus*), hyaenas (*Hyaena hyaena*) and caracal (*Caracal caracal*) remain within the area (Fisher, 1999) due to disturbance, loss of prey species resulting from hunting, and direct persecution and eradication by humans.

HERPETOFAUNA

Thirty-three reptile species may occur in the Project Area. Three are classified as regionally endemic (*Pristurus carteri, Pristurus minimus*, and *Pseudoceramodactylus khobarensis*) and are three included on the CITES Appendix II species list (*Uromastyx aegyptia microlepis, Varanus griseus, and Eryx jayakari* (IUCN, 2019)).

Oman boasts a rich reptile diversity, with 96 terrestrial species recorded including both endemic and threatened species. Unidentified reptile burrows and tracks were observed during the site visit.

ECOLOGICAL CONSERVATION AREAS

Ecological conservation areas (IUCN, 2019) are not found within or close to the project site. The nearest conservation area is the Rubh Al Khali National Resource Reserve, over 200 km to the south of the Project Area.

3.6.3 | HYDROGEOLOGY

SOIL AND SURFACE GEOLOGY

The outcrop geology of Oman has been mapped in detail by BRGM (Bureau de Recherches Géologiques et Minières) on behalf of the Ministry of Petroleum and Minerals.The major geological units exposed in the Project area illustrated in Figure 3-3 insert map.

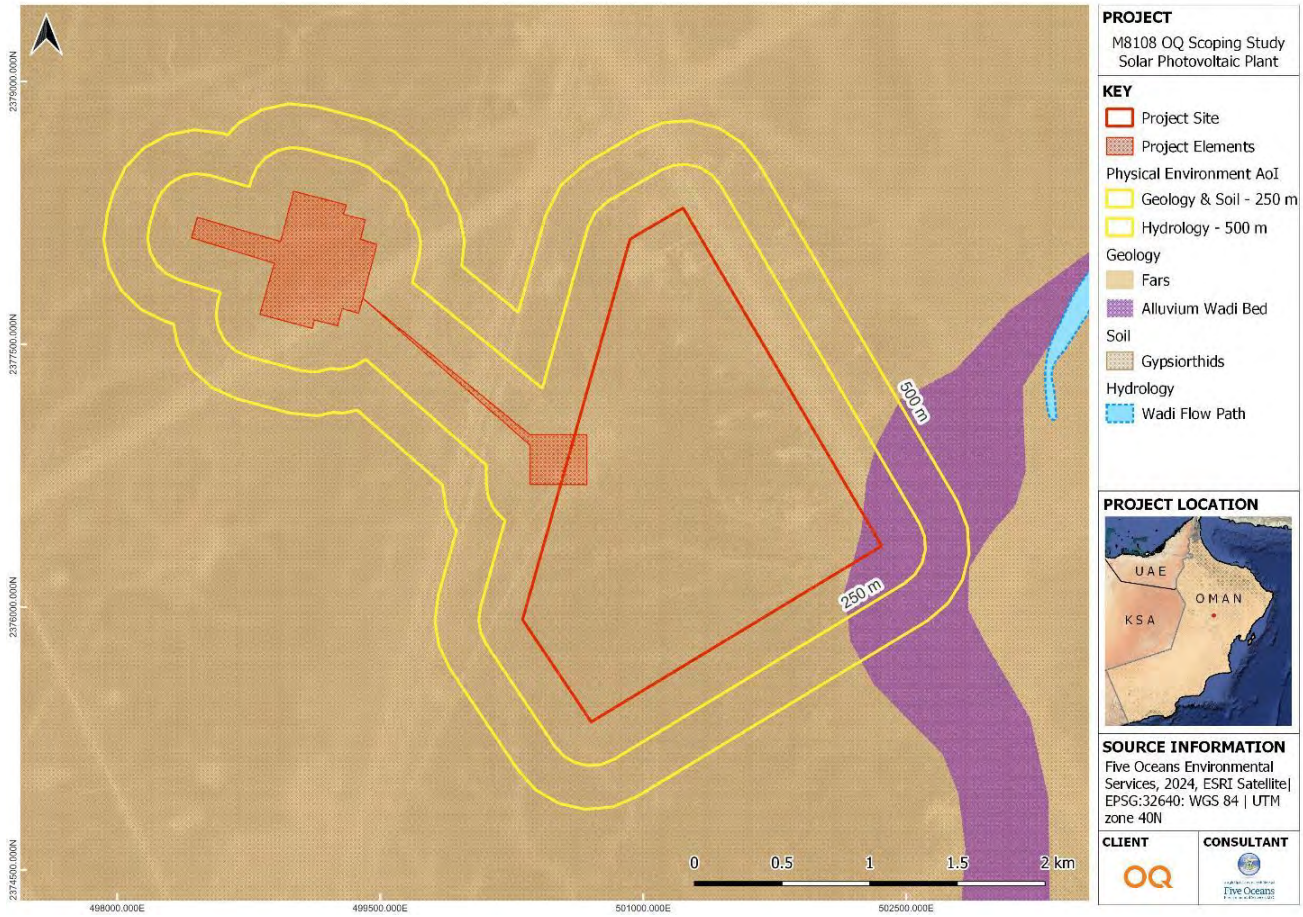

Figure 3-3: Soil and Geology area of interest

HYDROGEOLOGY

Major aquifers include the alluvium, Fars, and the Umm er Radhuma (UeR) formations. Alluvium aquifers refer to the sabkha deposits of the Umm as Samim (UaS) lying throughout the wider Project area, in particular the northern / Al Jaleel area in PDO's Block where near-surface highly saline water is present. UaS aquifer is unconfined and the water table is almost level throughout. Brine is present within the shallow sand and salt layers of the basin, though the properties of the aquifer and the brine vary significantly (i.e. spatially and vertically). Figure 3-4: Indicative flood risk areas on the site.

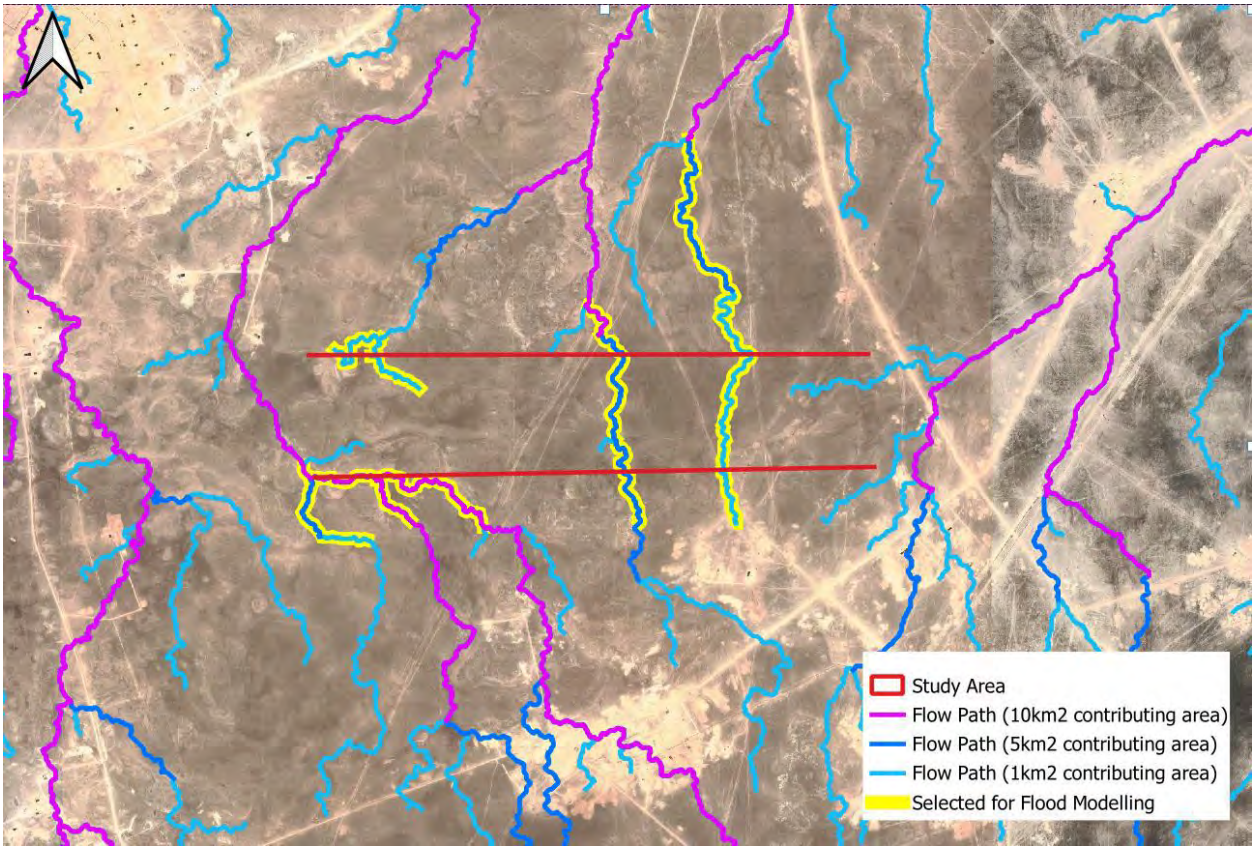

Figure 3-4: Indicative flood risk areas on the site

The Umm er Radhuma (UeR) is a laterally extensive and probably continuous formation throughout the area. The upper Umm er Radhuma (UeR) is a laterally extensive aquiclude, with an average thickness of 125 m, which isolates the upper groundwater from useable groundwater below. Within the lower part of the Upper-UeR and top part of Middle-UeR, groundwater exists within narrow and isolated flow paths that are often not laterally extensive. Below is the Middle-UeR which is regionally the principal aquifer horizon. The M-UeR is a confined aquifer, production from which is artisanal. It is almost certain that all M-UeR aquifers are interconnected and may be treated as a single flow regime

Groundwater Recharge and Aquifer Importance

The Fars / Dammam /Rus aquifers exposed within the area are considered likely to accept direct recharge, however rainfall is low to non-existent in any one year. The Rus and UeR aquifers are unlikely to accept any recharge directly from rainfall as these formations underlie the Fars / Dammam / Rus which act as an aquiclude. All previous investigations are in agreement that recharge mainly occurs either within the Dhofar Mountains, where these aquifers are exposed, or through direct infiltration of wadi flows that occur infrequently in parts of the south Oman where the UER is unconfined. A further component of groundwater recharge to the project area through Saudi Arabia is also

postulated. The project area is neither within an aquifer recharge zone nor an aquifer protection zone (MD 192 /2001 and MD 195/2001). It should be noted that the UN-ESCWA publication, 'Inventory of Shared Water Resources in Western Asia, 20 June 2013' identifies the Umm er Radhuma-Dammam Aquifer System (South) as an aquifer of International Importance.

GROUNDWATER RESOURCES

Quaternary, Fars, Dammam, Rus and UeR aquifers are present within the study area. Due to the high aridity of the area, surface water resources are not present, and surface watercourses are absent or poorly developed. Groundwater is therefore the only available water resource in this area of Oman.

The Middle UeR is the most productive, sustainable and utilizable flow zone throughout much of south and interior Oman.

3.6.4 | ARCHAEOLOGY

Whilst no archaeology has been noted on the site an understanding of the regional context is necessary. Regional archaeological information is typically limited to the southern Rubh Al Khali and predominantly pertains to Neolithic chipped stone tools in Ramlat Fasad; far to the south of the Project Area on the southern dune front of the Rubh al Khali.

AMBIENT AIR QUALITY

The ambient air quality of the Project Area is expected to be typical for a desert, rural environment, however neighbouring oil and gas exploration and production activities may cause local and regional impacts to air quality **Error! Reference source not found.**.

Table 3-2: Main emission sources in the wider project area

Emissions source	Owner	Possible emission type
Mabrouk processing facilities	PDO	Flare
Saih Rawl processing facilities	PDO	Flare, power generation
Qarn Alam processing facilities	PDO	
Ghubra processing facilities	PDO	Flare
Barik processing facilities	PDO	
Anzuz processing facilities	PDO	

Emissions source	Owner	Possible emission type
Al Huwaisah	PDO	Flare, power generation
Abutabul processing facilities	OOCEP	
Khazzan processing facility	BP	

In addition to emissions associated with combustion processes further sources that may influence regional ambient air quality include waste management and disposal facilities (PDO, OOCEP, BP); traffic using national road infrastructure; fugitive emissions from well-heads, pipelines, processing and storage equipment; and emissions from aircraft using the Qarn Alam airport, nearby to the project site.

NOISE

Settlements are present beyond the Project Area itself but not within it. Noise impacts to settlements resulting from Project activities are not anticipated to affect the public environment, but may be associated with occupational health (i.e. to workers during construction) which will be assessed and managed separately from this EIA.

SOCIO-ECONOMICS AND HEALTH

The Project Area lies predominantly in Adh Dhahirah Governorate. The Wilayat Centre of Al Wusta, Haima lies approximately 100 km to the south of the project site, while the Wilayat Centre of Ibri lies approximately165 km to the north. Haima is the regional administrative centre for Al Wusta Governorate, while Ibri is the administrative centre for Adh Dhahirah Governorate. The Walis' Offices, Municipality Offices, and regional representative offices for the Environment Authority (EA) and the Ministry of Regional Municipalities and Water Resources (MRM&WR) are located in both Ibri and Haima.. The nearest permanent, non-oil and gas related settlement to the concession is Abu Thaylah (located within Wilayat Adam, Adh Dhakhiliyah Governorate) to the east. Further settlement in the vicinity of Abu Thaylah includes Qarat al Milh and Burhaan, as well as Ghabah where there is a primary school.

NATIONAL ROAD NETWORK

The Project area is located approximately 30 km from the Adam to Haima dual carriageway. Extensive surfaced (black-topped) roads are currently rare within the Project area, which is due to the immaturity of oil and gas development within the area to date, and the absence of other land use practices.

UTILITIES AND PUBLIC SERVICES

Due to the largely undeveloped nature of the area and absence of populations, there are currently no public utilities (mains water supply, main electricity, mains gas, public sewerage, waste disposal facilities) present in the project vicinity. Clinics, hospitals, schools, public buildings and services are not present. The nearest Royal Oman Police station is located at Saih Rawl. Water supply wells to the public water mains are absent from the concession. Project area via overhead power lines from the power plants at Saih Rawl and Qarn Alam. Overhead power lines extend south from Saih Rawl to Barik, passing to the east of the Manal project area

LAND USE

The only socio-economic activity carried out at present within (and around) the project area and concession area relate to oil and gas exploration, appraisal, and production activities. In general terms, the Project Area has been extensively explored by PDO over the past decades. Activities primarily relate to 2D and 3D-seismic surveying, and exploration drilling. Evidence of 3D-seismic surveying by PDO is evident in the Jaleel and Manal areas, where clear surface scarring and clearance of vegetation remains 5-10 years after the completion of the work. Roads and pipelines cross the wider project area from concessions (Block 60) to the west to Saih Rawl in the east.

3.6.5 | CLIMATE CHANGE

Climate change within Oman is broadly modelled by SQU (Sultan Qaboos University, 2018) across the entire country. Available data is limited to a 33-year period and should be viewed as a snapshot for inferring likely trends only, given that the phenomenon occurs over much larger time scales.

CLIMATE CHANGE DATA

Climate change projections are based on IPCC AR5 (2013) with the exception of the sea level rise projections which are based on IPCC AR6 (2022). The projections follow two future periods:

2040-2059 and 2060-2079 for two representative concentration pathways (RCPs):

- ▪ RCP4.5 – stabilization scenario;
- ▪ RCP8.5 – business-as-usual.

Projections for tropical cyclone were based on simulated changes in frequency and intensity from Bloemendaal *et al*. (2020) for future period 2015-2050 under RCP8.5.

REGIONAL AND LOCAL CONTEXT

Moderate warming (mean of 0.3- 0.7°C) is associated with southern Oman where the Project is located. A similar trend is typical of drought conditions whereby northern Oman generally experiences more droughts. In terms of Representative Concentration Pathways3 (RCPs; developed by the IPCC), SQU (Sultan Qaboos University, 2018), describe conservative (RCP 2.6) and extreme (RCP 8.5) scenarios of change expected by 2041-2060 (relative to historical records: 1980-2013)

4 SCOPING

4.1 | APPROACH

The aim of the EIA process is to provide EA with a robust and transparent assessment of the Project's potential or actual environmental impacts to allow the issuing of an environmental permit and to comply with OQ's internal control framework. The EIA will be conducted to national Omani standards (as per the requirements of EA) and should OQ seek project finance there may be a requirement to upgrade the EIA to IFC and align with recognised international practices. Once the scope of work has been agreed, baseline studies will continue to inform the assessment of potential impacts. Mitigation measures will be incorporated into the Project: design, construction, and operation. The EIA report will be submitted to EA with continued engagement to provide additional information if needed.

4.2 | ENVIRONMENTAL ASPECTS REGISTER

The Scoping Phase requires the identification of potential significant positive and negative impacts, opportunities and constraints, as well as alternatives and mitigation measures which need to be evaluated and investigated during the EIA phase. Typical environmental aspects relevant to the proposed Project are outlined in **Error! Reference source not found.**. Most of the impacts that will arise from the establishment of the solar PV plant will be associated with the construction phase of the Project and are typically short-term and anticipated to be minor in nature. Potential construction impacts are typically associated with:

- Soil disturbance;
- Water resource use;
- Local infrastructure (e.g. waste management);
- Air quality (generation of dust, emissions from diesel vehicles and equipment);
- Noise / vibration from vehicles and machinery; and
- Vehicle traffic.

Potential operational impacts will largely be associated with:

- Visual aesthetics of the solar PV plant and ancillary infrastructure;
- Periodic vehicle movements to the site for the purposes of site operation and maintenance activities
- Generation of minor operational noise (e.g. transformers);

- Periodic discharge of wastewater to land (from quarterly washing of PV modules); and
- Generation of small volumes of waste (e.g. oily rags).

Positive Project impacts are associated with:

- Supplementation of fossil fuel energy with cleaner renewable solar energy (climate change); and
- Employment generation.

Mitigation measures to enhance and reduce positive and negative impacts respectively will be included in the EIA but are beyond the scope of this report.

Table 4-1: Environmental aspects contextualising potential and likely Project impacts.

Aspect	Potential Impact	Likely Impact After Mitigation
Site clearance	- Long-term: - Loss of vegetation and habitat. - Disruption of surface drainage through infilling and diversion of potential drainage flow. - Potential loss or disturbance of fauna (e.g. reptiles and small mammals). - Loss of soil seedbank.	- Permanent diversion of water away from the Project site. - Long term prevention of vegetation growth on Project site. - Permanent relocation of disturbed fauna. Plot suitable for industrial economic development.
Visual aesthetic	- Temporary: Potentially reduced temporary visual appeal from establishment of temporary laydown areas, site construction offices, site construction activities etc.	Potential negative impacts cannot be significantly reduced but will be temporary in nature.
Noise/ Vibration	- Temporary: - Disturbance of local fauna. - Disturbance to immediate industrial neighbors. Disturbance of local residential community.	None anticipated.
Air-quality	- Temporary: - Generation of undesirable air emissions (e.g. VOCs and CO_2). Generation of dust.	Minimal air emissions below Oman legislated limits.
Climate change	- Long-term: Solar PV plant will result in positive displacement of GHG emissions that would otherwise be	Positive benefits anticipated.

Aspect	Potential Impact	Likely Impact After Mitigation
	generated through non-renewable sources of electricity (e.g. gas).	
Employment	- Temporary: - Generation of jobs (direct and indirect) during construction and operation activities. - Long-term: Few ongoing employment benefits during Operation and Maintenance.	- Maximum inclusion of Omani employees and skills development. Employment will be temporary in nature, with small ongoing employment benefits.
Site Contamination	- Temporary: - Potential soil and water contamination from vehicle and machinery leaks and spills. - Permanent: Transboundary deposition of particulates e.g. from natural sources, neighbouring industrial activities, etc.	None anticipated.
Water discharge to land	- Long-term: Discharge of wash water (i.e. water with no detergent) to land from periodic cleaning of deposited dust on PV panels.	None anticipated.
Waste generation	- Short- and Long- term: Reduced landfill capacity during construction and operation activities.	None anticipated.
Traffic movements to/from site	- Short term: Temporary increase in traffic movements to/from site during construction causing disruption to other road users.	Temporary noise, dust, and safety hazard.
Soil damage	- Long term: - Soil compaction. Reduced water infiltration.	None anticipated.

The above list of potential impacts (Table 4-1:) is not exhaustive and a full list will be provided in the EIA.

4.3 | ASPECTS PROPOSED TO BE SCOPED OUT OF THE ENVIRONMENTAL IMPACT ASSESSMENT

4.3.1 | HEAT AND THERMAL RADIATION

While some studies suggest that large scale PV plants can cause a localised cooling effect depending on the efficiency and placement of the PV panels (Taha, 2013 and Masson *et al.*, 2014), Gafford *et al.* (2016) reports that solar PV sites may generate a local 'heat island' of 3-4^{o}C above typical temperatures within 30 m of the panel boundary. It should be noted however that these potential 'heat islands' are less than that which can be caused by establishing hard surfaced infrastructure (e.g. cement surfaces, asphalt roading, etc). Heat and thermal impacts associated with the solar PV power plant will therefore be scoped out from further assessment in the EIA report.

4.3.2 | LIGHT REFLECTION

Solar PV modules absorb rather than reflect light (i.e. are typically low in reflectivity), meaning the solar PV plant is not thought to significantly affect birds or onlookers through light reflection (glare). Impacts from light reflection is therefore proposed to be scoped out from further assessment in the EIA report. Lake effect is separate to light reflection, which should still be assessed as part of the EIA.

4.3.3 | ELECTROMAGNETIC RADIATION

Solar PV modules, like any electrical devices, create electromagnetic fields (EMF) and thus will emit electromagnetic radiation (EMR) when in use. This can typically arise from the either the PV modules or inverters. However, the EMR is non-ionizing (i.e. does not produce microwaves) and at low frequencies; poses negligible, if any, harm to human health (WHO, 2019). For this reason, impacts from EMR will be scoped out from further assessment in the EIA report.

4.4 | PRELIMINARY OUTLINE OF POTENTIAL IMPACTS

The Scoping Phase requires the identification of potential significant positive and negative impacts, opportunities and constraints, as well as alternatives and mitigation measures which need to be evaluated and investigated during the EIA phase.

Expected environmental aspects relevant to the proposed Project are outlined in. All aspects will need to be further assessed in the EIA (in conjunction with cumulative effects

and neighbouring established activities) as available information pertaining to each is currently deficient.

The Scoping Stage requires the identification of potential significant positive and negative impacts, opportunities and constraints, which need to be assessed during the ESIA stage.

During the scoping process, information on potential impacts has been collected from several sources. The site visit was conducted in December 2023 and the liaison with environmental specialists from 5OES were considered as expert judgement input.

The table below provides the preliminary impact scoring for both construction and operational phases. Following implementation of mitigation measures we consider that these impacts could be reduced further.

4.5 | ENVIRONMENTAL AND SOCIAL RISK IDENTIFICATION

An overview of the main E&S impacts is provided in this section.

4.5.1 | CONSTRUCTION PHASE

Below Table describes the Preliminary Impact rating during Construction phase

Table 4-2: Preliminary Impact rating – Construction phase

	Component						Scoring					
Anticipated Impact (construction phase)	Size/Severity	Importance & Value	Sensitivity	Timeframe	Reversibilty	Certainty	Importance & Value	Sensitivity	Timeframe	Reversibilty	Total	Magnitude
Air quality	M	M	L	L	R	H	2	1	3	1	7	Moderate
Water	M	M	L	M	R	H	2	1	2	1	6	Minor/Moderate
GHGs	L	L	L	L	R	M	0	0	2	0	2	Minor
Light	M	L	L	M	R	L	1	1	2	1	5	Minor/Moderate
Noise	M	M	L	L	R	H	2	1	3	1	7	Moderate
Vibration	M	L	L	L	R	M	1	1	3	1	6	Minor/Moderate
Landscape and Visual	L	L	L	L	R	L	0	0	2	0	2	Minor
Terrestrial Habitat/Biodiversity	L	L	L	L	R	M	0	0	2	0	2	Minor
Birds	M	L	M	L	R	M	1	2	3	1	7	Moderate
Topography/Soil/Ecology	M	M	M	M	R	H	2	2	2	1	7	Moderate
Social	L	L	L	M	R	M	0	0	1	0	1	Minor
Human	L	L	L	M	R	L	0	0	1	0	1	Minor

Table 4-3 and Table 4-4 Table 4-4 demonstrates the Environmental and social risk identification in construction phase.

Table 4-3: Environmental and social risk identification- Construction phase

Component	Sources	Impacts	Action/Management Plan
Air quality	Engine driven construction machinery, diesel generators, transport vehicles, fuel oil storage tanks, traffic movement and significant earthworks.	Dust and particulate matter (PM), oxides of nitrogen (NOx), sulphur dioxide (SO2), carbon monoxide (CO), and unburned hydrocarbons (HC).	Air quality baseline is required, develop dust suppression mitigation measures, summarize these in project construction ESMP and develop procedures on air quality. Implementation of suitable mitigation strategies would reduce the aforementioned Impact as much as possible, ensuring that no significant impact occurs due to the development.
Water quality	Alteration of drainage patterns from turbine foundations, underground cable laying, building of access roads, and other ancillary infrastructure.	Increased erosion and surface water runoff.	Undertake a Flood Risk Study and geotechnical study to appropriately manage surface flow and drainage to avoid erosion due to extreme weather events (see also section Climate Risk Assessment. In addition, adequate mitigation and monitoring measures regarding water management need to be included in the ESMP.
Waste	Various construction processes could generate Construction and Demolition (C&D) waste.	Solid, semi-solid and liquid Hazardous and N-h* construction and demolition wastes and general refuse N-h non-recyclable wastes such as excavated soil, domestic waste, etc; N-h recyclable wastes Hazardous non-recyclable wastes Hazardous recyclable wastes	It is expected that a Waste Management Plan will be adopted for the works that will implement the 4Rs – reduce, reuse, recycle and recover. More detail on the requirements of this plan will be provided in the subsequent EIA Report. Appropriate construction design and mitigation waste impacts would be expected to be of minor or moderate significance at worst. Undertake GHG emissions calculations and take actions as needed (consider national and lenders requirements if specific thresholds are surpassed, GHG reporting becomes mandatory).
Light noise and vibration	Noise would include equipment such as piling rigs, excavators, lorries, compressors, pumps, dump trucks, cranes or concrete mix delivery Noise from transport vehicles will be only transient for a given location	Noise levels at the work site will be in excess of 85 dB(A) during construction. With respect to the ambient, noise is attenuated by distance (typically noise levels drop by about 40 dB(A) at 100 m distance from source	Identify sensitive receptors, undertake noise baseline, develop/implement adequate mitigation measures in line with Omani and international noise standards, summarise in project construction ESMP and procedures on noise, light and vibration.

Component	Sources	Impacts	Action/Management Plan
		nuisance along with the construction noise to the workers.	
Landscape and visual	Construction activities	Disturbance of livestock or making areas of land unsuitable for grazing.	Action: Include a restoration plan for the site. Restoration of disturbed areas minimise the timeframe of the impact. The ability to restore damaged land makes any impact reversible. The visual impact would be minimal and the temporary receptors travelling nearby would be relatively insensitive to the impacts.
Terrestrial habitat/ Biodiversity	Project development, through site clearing, construction of foundations, trenching of cables and auxiliary facilities.	Alteration of the habitat Some native habitats will be lost during the construction	An environmental management plan addressing flora and fauna preservation and restoration of affected areas should be prepared and implemented. Action: Undertake a biodiversity baseline (and specific birds and bats survey), perform critical habitat assessment, develop mitigation measures, summarise in project construction ESMP and a biodiversity Management Plan. Address any potential sensitives, regarding birds' migration routes
Social	Construction phase of the project	Employment and local procurement priorities, labour influx affecting the dynamics of the local communities, the interaction between communities, increase of construction nuisance by the local communities due to noise, dust, increased traffic on roads, pressure on the availability of certain resources and products	Undertake a social baseline and impact assessment, develop suitable mitigation measures,

Component	Sources	Impacts	Action/Management Plan
Human rights	Due to the development of project	A Human Rights risk/impact assessment will yield results on the real-time strengths and weaknesses of the Human rights practices via evidence-based data.	Carry out a Human Rights risk/impact assessment in alignment with UNGP's Guiding Principles on Business and Human Rights and the Equator Principles (e.g. using methodology, local context, benchmarking, identification of actual/potential human rights risks, company practices, risk mitigation measures and access to remedy).

4.5.2 | OPERATIONAL PHASE

Table 4-4: Environmental and social risk identification- Operation Phase

Component	Sources	Impacts	Action/ Management Plan
Water quality	The construction of wind turbines within these features could therefore alter the hydrology of the area potentially causing localised flooding if located in wadi channels or the floodplain.	Water contamination	Undertake a Flood Risk Study and depending on the outcome a Flood Management Plan may need to be developed. The implementation of suitable mitigation strategies would reduce the aforementioned impact as much as possible, ensuring that no significant impact occurs due to the development.
Noise	Noise will relate to mechanical and aerodynamic sources as the wind turbines turn.	Significant noise impacts	Though the noise is expected not to be significant anymore at a distance of 500 m from the wind array location (with wind turbines of max 3MW), this needs to be confirmed by a noise modelling study and assessment. The noise levels and impact also highly depend on the chosen size and height of the turbines.
Landscape and visual	Due industrialized nature of the landscape and low-lying nature of the plant	The change in land use would result in the complete and direct loss of a small total area of grazing grounds, therefore the impact can be considered small.	As part of the socio-economic baseline sensitive receptors at and surrounding the site as well as potentially sensitive viewsheds surrounding the site should be identified. Subsequently, maps with zones of visual influence should be prepared and a landscape and visual impact assessment (including shadow flickering) should be undertaken as part of the ESIA.
Terrestrial habitat/ biodiversity	Operational noise and shadow flicker from turbine blades could disturb species utilizing habitat nearby	Direct habitat loss and fragmentation through the construction of wind farm infrastructure; Fatality through collision with moving turbine (rotor) blades; and Displacement of birds through disturbance.	Undertake a biodiversity baseline (and specific birds and bats survey), develop mitigation measures, summarise in project construction ESMP and a Biodiversity Management Plan. Address identified sensitives, especially in relation to IBA area and birds' migration routes.

Component	Sources	Impacts	Action/ Management Plan
Collision risk turbine	Due to turbine blade	Bird and bat collisions represent an immediate, direct mortality impact	Undertake a biodiversity baseline (and specific birds and bats survey), develop mitigation measures, summarise in project construction ESMP and a Biodiversity Management Plan. Address identified sensitives, especially in relation to birds' migration routes. Controls should be put in place to ensure that unnecessary habitat destruction does not occur.
Collision risk and electrocution with OHLs	Overhead electricity transmission power lines	Pose a threat to avian and bat populations through the risk of electrocution and collision.	Controls should be put in place to ensure that unnecessary habitat destruction does not occur. Consideration will also be given to the timing of construction works to avoid sensitive periods.
Displacement	Construction works	Large and medium-sized wild mammals are likely to be permanently excluded from the site if it is fenced but similar habitat of similar quality is available elsewhere in the area and the impact is likely to be minor	Undertake a biodiversity baseline (and specific birds and bats survey), develop mitigation measures, summarise in project construction ESMP and a Biodiversity Management Plan.
Topography/Soil/ Geology	Mitigatable impacts from maintenance and operations are expected only from PV solar array.	Expected impacts relate to soil contamination due to water effluents from cleaning under the PV panels.	Develop Soil Erosion Management Plan and consider restoration of vegetation where possible.
Social and human rights	Due to the development of the project	No critical social and human rights impacts are expected	No actions are recommended due to the absence of social receptors.

4.5.3 | OPERATIONAL PHASE

Below table detailed the Preliminary impact rating during operational Phase

Table 4-5: Preliminary impact rating – Operational Phase

	Component						Scoring					
Anticipated Impact (operation phase)	Size/Severity	Importance & Value	Sensitivity	Timeframe	Reversibilty	Certainty	Importance & Value	Sensitivity	Timeframe	Reversibilty	Total	Magnitude
Water	M	M	L	L	R	H	2	1	3	1	7	Moderate
Noise	L	L	L	L	R	M	0	0	2	0	2	Minor
Landscape and Visual	L	L	L	L	R	M	0	0	2	0	2	Minor
Terrestrial Habitat/Biodiversity	L	L	L	L	R	L	0	0	2	0	2	Minor
Birds	M	L	L	M	R	L	1	1	2	1	5	Minor/Moderate
Topography/Soil/Ecology	M	M	L	L	R	H	2	1	3	1	7	Moderate
Social and Human rights	M	L	L	L	R	M	1	1	3	1	6	Minor/Moderate

4.6 | CLIMATE RISK ASSESSMENT

Oman is highly vulnerable to climate change and expected to experience increased extreme heat and cyclones in coming decades. This means that in the future a higher chance of potentially damaging risks is expected at the renewable energy generation sites. A more detailed assessment is needed to consider the impacts of climate change.

4.6.1 | SOLAR POWER:

- Increased air temperature reduces cell efficiency and energy output and lowers capacity of
- underground conductors if high ambient temperature increases soil temperature;
- Increased rainfall can wash away dust for the short term but reduces panel efficiency (less solar radiation);
- Increased heavy rainfall can increase the risk of pluvial flooding of the area;
- Changes in wind speed turbidity increases efficiency and output from the cooling effect of wind, but can scour PV panels and lower output if air is gritty/dusty;
- Rapid changes in cloud cover lowers efficiency and output and can destabilize the grid;

- Extreme weather events, such as stronger and/or more frequent storms, can damage systems;
- Sea level rise can affect the site and related infrastructure.

The identified climate change parameters with a significant risk are:

- Rainfall: The frequency of daily heavy rainfall is expected to increase, and the intensity of extreme rainfall events (100-year return period) is expected to increase significantly according to some climate projections.
- Maximum temperature: More extreme maximum temperature is expected where the number of very hot days, temperature above 40 ˚C, is doubled and the probability of a heat wave per year increases from 12.5 to 41.5% in the period 2060-2079 under RCP8.5.
- Extreme wind: More extreme wind is expected with an increase of the days with strong winds, gust wind higher than 15 m/s, and a frequency increase of tropical cyclones.

4.6.2 | DESIGN AND CONSTRUCTION PHASE

RAINFALL

Increased daily heavy rainfall reduces panel efficiency of the PV solar array due to less solar radiation and can cause pluvial flooding during extreme rainfall events. Following actions are proposed:

- Consider future change in efficiency of the PV solar array in design specifications.
- The PV solar array is planned within the wadi drainage system without any current flood protection; therefore, it is recommended to study the drainage system with a pluvial flood risk assessment considering future changes of rainfall and implement mitigation measures to provide required level of flood protection and / or to inform optimized solar array layout that maximally avoids risk areas. The general approach for the flood risk assessment:
- Three design events to define possible flooding for the baseline (current) design are
- recommended (1:10, 1:50 and 1:100-year events);
- It is likely that a rain-on-grid approach to the modelling will be undertaken whereby the hydrology and hydraulics are calculated within a single model. This will present a clearer understanding of where runoff routes to;
- Use of software HEC-RAS 6.1 or similar, with a 2D approach to modelling being adopted (to make best use of available terrain data and enable a rain-on-grid approach);

- Terrain (elevation) data is the foundation of a hydraulic (flood) model and significantly affects the accuracy of the resulting flood simulation, with more detailed elevation data, the more accurate the resulting flood model. It is recommended that either a drone survey or lidar survey shall be conducted of the study area. This will enable more accurate flood results and allow better definition of the conceptual diversions (according to actual terrain);
- Any existing or proposed culverts/bridges should be included in the flood model and need to be provided. At a minimum this should include invert levels at the upstream and downstream ends, and dimensions of the structure.

MAXIMUM TEMPERATURE

Extreme temperature can affect the performance of the wind and solar systems from a reduction in wind energy generation from reduced wind during heat waves and lower PV solar cell efficiency with increased air temperature. Following actions are proposed:

- Incorporate robust design specifications with structure allowance to withstand and function effectively under an increased number and duration of very hot days;
- Consider health and safety instructions for very hot days in the warmest months from April to September.

EXTREME WIND

The increase in extreme wind can reduce wind generation (turbines cannot operate in very high winds) and can decrease solar power efficiency with gritty/dusty wind. The increase in intensity and frequency of storms, can damage the systems and scour the solar panels. Following actions are proposed:

- Incorporate design specifications with structure allowance to withstand increased extreme wind and Category 1 tropical cyclone wind speeds (33-43 m/s);
- Consider health and safety instructions, for working at height, hosting operations with extreme wind during the winter monsoons 'Shamal'.

4.6.3 | OPERATIONAL PHASE

RAINFALL

Increased daily heavy rainfall reduces panel efficiency of the PV solar array from less solar radiation and can cause pluvial flooding during extreme rainfall events. Proposed actions:

- Incorporate adaptation measures to cope with decreased efficiency of the PV solar array;
- Based on the outcome of the pluvial flood risk assessment, incorporate adaptation measures for drainage.

MAXIMUM TEMPERATURE

Extreme temperature can affect the performance of the system from a reduction in wind energy generation from reduced wind during heat waves and lower PV solar cell efficiency with increased air temperature.

Proposed actions:

- Incorporate adaptation measures in the grid network to cope with decreased performance of wind energy and increased generation of solar energy;
- Consider health and safety instructions for an increased number and duration of hot days.

EXTREME WIND

The increase in extreme wind can reduce wind generation (turbines cannot operate in very high winds) and can decrease solar power efficiency with gritty/dusty wind. The increase in intensity and frequency of storms, can damage the systems and scour the solar panels.
Proposed actions:

- Incorporate adaption measures to cope with decreased performance of wind energy;
- Review maintenance operations to clear the solar panels from dust to increase efficiency;
- Incorporate adaptation measures to cope with increased storm winds and tropical cyclone wind speeds;
- Consider health and safety instructions, such as working at height, hosting operations for an increased number of extreme wind days.

5 CONTENT OF ENVIRONMENTAL IMPACT ASSESSMENT

5.1 | APPROACH

The aim of the EIA will be to provide EA with a robust and transparent assessment of the Project's actual and/or potential environmental impacts to inform the environmental permitting process. The EIA will be conducted in line with Oman regulatory standards and recognised international good practices for impact assessment and result in recommendations to incorporate into the development planning, as well as the actual construction and operation of the development.

5.1.1 | ESIA METHODOLOGY

The proposed ESIA methodology is provided in the appendices.

5.1.2 | CUMULATIVE IMPACT ASSESSMENT

A cumulative impact results from the successive, incremental and/or combined effects of a development when added to an existing, planned and/or reasonably anticipated future development. An impact from a development that may not be significant in isolation, may become significant when added to existing and potential impacts from similar or other developments in the area.

IFC (2013) has developed a Good Practice Handbook: Cumulative Impact Assessment and Management which describes a preliminary approach for develops in emerging markets to conduct a (rapid) cumulative impact assessment.

5.1.3 | CLIMATE CHANGE IMPACT ASSESSMENT

Various methodologies exist for undertaking climate change impact assessment, especially depending on the sector and proposed development, e.g.:

- Equator Principles 4 Guidance Note on Climate Change Risk Assessment, Task Force on Climate related Financial Disclosure, 2017;
- Climate Risk and Vulnerability Assessment Guideline developed by Asian Development Bank, 2017;
- the Social, Environmental and Climate Assessment Procedures developed by International Fund for Agricultural Development, 2021;

- European Commission Guidance on integrating climate change and biodiversity into Environmental Impact Assessment, 2013.

5.1.4 | HUMAN RIGHTS IMPACT ASSESSMENT

In keeping with international requirements, a Human Rights Impact Assessment (HRIA) should be conducted.

5.1.5 | STAKEHOLDER ENGAMENT PLAN

Stakeholder engagement is a long-term process that requires building trust, mutual respect, understanding and open dialogue between the parties involved. The main objectives for this Stakeholder Engagement Plan (SEP) is:

- to indicate potential impacted project stakeholders and
- provide recommendations on how to engage with all stakeholders throughout the course of the
- project (e.g. construction, operation and decommissioning phases) in order to
- keep them well informed and seek their inputs into the project.

Key to a success is early engagement. This provides a valuable opportunity to influence public perception, identify legacies and set a positive tone with stakeholders early on.

The focus of the SEP is on the external stakeholder groups such as affected communities, local government authorities, non-governmental and other society organisations, local institutions and representatives and other affected parties. Special attention should be given to the presence of vulnerable groups (e.g. disabled, elderly, women, minorities) in the project AoI. Further, the SEP enables the discussion of topics that are particularly sensitive or controversial. For these groups and topics, specific focus group discussion will be held. This could also require specific (tailor made) consultation (different setting, formal procedures and customs) and engagement to these needs.

5.2 | BASELINE STUDIES

The Project's baseline environmental and socio-economic condition will be characterised through desktop literature review and field surveys.

5.2.1 | LITERATURE REVIEW

Five Oceans will review available baseline data for the lease area directly affected by the Project. Literature review will identify potential physical and biological environmental receptors and describe socio-economic data in the Project area.

5.2.2 | FIELD SURVEY

While the Project site is already largely disturbed a field survey of the site shall be done to assess its context. Adjacent (undeveloped) land will also be assessed to understand the site's original status (e.g. in the context of eco-system services) to facilitate eventual decommissioning of the site. The following information will be described following the site visit:

- Weather and Climate (Meteorology);
- Terrestrial Ecology; and
- Socio-Economic Conditions.

5.2.3 | ENVIRONMENTAL BASELINE MEASUREMENT

The baseline studies will determine the current physical and socio-economic characteristics of the Project area, which will be summarised as a chapter in the EIA report. Table 5-1shows the Environmental Baseline measurement

Table 5-1: Environmental Baseline measurement

Use of local infrastructure and use of natural resources				
Aims and objectives	**Methodology**	**Information sources**	**Assumptions**	**Uncertainty and data gaps**
Assess demand on local infrastructure and use of natural resources	Desktop review of potential impacts related to use of natural resources and infrastructure	Project resource use estimates; Geotechnical assessment; Zero baseline assessment; Flood risk assessment; and Master plans	The effectiveness of this assessment will depend on the quality of information available with regard to the implementation of the project, which will put in place the necessary infrastructure to enable the project to be realized.	NA
Landscape and Topography				
Determine impacts on local landscape and topography arising from the project	Field data (project site topography will be assessed through a walk-over survey to identify any notable topographical features within the project boundaries).	Master plan design	Topographical features within the project boundaries have already been disturbed by PDO	NA
Air Quality, Noise, Vibration and Climate Change				
Determine impacts on air and noise quality and climate change within the context of national legislation	Dust (PM10) concentration will be established using automatic monitoring equipment at 3 station, Sampling will be for 15 minutes at each of the 3 stations, and one station will be monitored for 24 hrs. Noise levels will be sampled for 30 minutes at 3 survey sites for daytime and evening. Estimates of GHG emissions saved (offset from grid import) from generation of solar electricity.	Field data; and Air, noise and climate change regulations	Emissions of air pollutants from the site will be low or negligible.	Data will show a snap-shot (limited perspective) of the environment and may not include seasonal noises or air quality changes.
Traffic movements				

Use of local infrastructure and use of natural resources				
Aims and objectives	**Methodology**	**Information sources**	**Assumptions**	**Uncertainty and data gaps**
Traffic impacts from proposed project on access roads	Traffic will be considered in the EIA in the sense of the likely impacts to local people, potential impacts of noise and any air quality concerns. A specific Traffic Impact assessment (TIA) will not be done (i.e. there will be no prediction or modelling of levels of traffic or impacts on the logistics of site access).	OQ/ PDO Life Saving Rules, EPC Contractor HSE Plans and, Master plan design	Traffic will be appropriately managed by EPC contractor in collaboration with PDO. Road network in the PDO area is appropriately designed and there is minimal additional work required to satisfy the traffic requirements of the Project.	Information is currently insufficient to determine impacts of project traffic on public roads. If traffic issues are considered to be significant, a TIA will need to be commissioned separately to the EIA.

5.3 | STAKEHOLDER ENGAGEMENT

Given that the Project is within the PDO concession area, formal stakeholder engagement meetings will only be undertaken if necessary. Potential stakeholders within the area include neighbouring industrial operations and relevant government authorities (Table 5-2) .

Table 5-2 : Potential Project stakeholders

Stakeholder	Justification and Purpose of Engagement
OQ	Landlord for the project. Coordination with respect to environmental management compliance and process, identification of material aspects and impacts. Identification of sources of existing baseline data.
EA (in Muscat) Office)	EA is the regulator and will be responsible for issuing the environmental permit.
Public Establishment for Industrial Estates	Landlord for Sohar Industrial Estate, which accommodates multiple industrial tenants. Identification of any potential concerns. Collection of existing baseline data and site conditions.
Wali	The Wali is the governor for the wilayat and is therefore the representative of the community. Given that this project will be developed in land that is already zoned for industrial activity, this meeting is designed as a courtesy meeting but will be helpful to identify any social issues in the area or environmental issues affecting surrounding communities.

5.4 | IMPACT ASSESSMENT METHODOLOGY

The impact assessment methodology (i.e. determination of impact significance) is provided in Appendix 1.

6 CONCLUSION

The proposed Project is aligned with Oman's aspirations for electricity supply diversification and climate change management. The Project site has already been largely disturbed by PDO related activities and ecology and archaeology are therefore not present within the site. Potential significant impacts are typically associated with the Project's construction phase with regards to temporary dust generation, as well as, vibration and noise. Operational impacts are expected to be insignificant with the exception of potential flood risks, which are already inherent (i.e. applicable if the Project is developed or not). Appropriate engineering design regarding surface drainage within and outside of the site boundary will be critical to ensure significant impacts (e.g. property damage and loss of life) do not occur.

7 REFERENCES

GUNERHAN H., HEPBASLI A., and GIsiteUNLU U. (2009) *Environmental Impacts from the Solar Energy Systems*; Energy Sources, Part A, 31:131–138, 2009; Copyright © Taylor & Francis Group, LLC; ISSN: 1556-7036 print/1556-7230 online; DOI: 10.1080/15567030701512733

Hyport Scoping study for Renewable Energy Site, 2023 (RHDHV/ 5OES)

WHO (2019) World health Organisation; *Electromagnetic fields (EMF);* https://www.who.int/peh-emf/about/WhatisEMF/en/index1.html; Accessed on 21 April 2019.

Shell Mabrouk ESIA, 2019 (5OES)

Shell Solar Qabas Scoping Report, 2019, (5OES)

APPENDIX 1: IMPACT ASSESSMENT METHODOLOGY

There are numerous methods used to determine environmental impacts, many of which are subjective. The approach used in this assessment is objective and verifiable so that conclusions regarding impacts can be transparent and peer reviewed. The methodology used to assess impacts is outlined below in the following six steps.

Step 1: Identify potential impacts associated with the Project. This is achieved through analysis of the Project to identify activities and processes with potential for interaction with the receiving environment.

Step 2: Identify receptors potentially at risk from identified impacts. Receptors (e.g. community, individual tree, or ecosystem, etc.) are identified through study of the receiving social, physical, and biological environment that may be affected by the Project. The baseline environmental data provides context for assessing potential impacts and allows identification of key risk factors to receptors. Baseline data also informs impact significance.

Step 3: Determine significance of potential impacts (i.e. level of effect) on receptors. Impact significance is determined using a systematic, consistent, and transparent scoring system based on impact size & severity in relation to four components of significance.

Impact 'size & severity' is classified as either:

- High (Large scale with multiple pathways of disturbance);
- Medium (Moderate to localised scale with typically one pathway of disturbance); or
- Low (Highly localised within project site with little or no disturbance).

Components of significance include importance & value, sensitivity, timeframe, and reversibility. As per the assessment of size & severity, components of significance are assigned scales of High, Medium, and Low. Components are summarised below for ease of reference:

- **Importance & value** relates to an impacts ability to disrupt environmental and social function;
- **Sensitivity** is the typical degree that an impact can change environmental and social functions;

- **Timeframe** relates to the period that an impact is directly and/or indirectly active; and
- **Reversibility** is the ability of an impact to be undone so that the pre-existing condition is restored.

The scoring matric used to determine significance is presented in the below table. Each component of significance is determined in relation to size & severity, and overall significance is calculated by adding the components together using the following formula:

Overall impact Significance = Size & Severity (Importance & Value) **+** Size & Severity (Sensitivity) **+** Size & Severity (Timeframe) **+** Size & Severity (Reversibility)

The combined score provides a range of significance on a four-point scale (Table 0-1) and includes a category for positive (beneficial) impacts. The calculation of overall significance (before and after the adoption of mitigation) is graphically shown using the Cousins EIA Calculator developed by 5OES. Table 0-2 explains the Levels of impact significance and their implications for the Project.

Table 0-1: Scoring matrix of significance component in relation to impact size & severity.

SIZE & SEVERITY	COMPONENT OF SIGNIFICANCE		
	Importance & Value		
	Low	Medium	High
High	2	3	4
Medium	1	2	3
Low	0	1	2
	Sensitivity		
	Low	Medium	High
High	1	3	4
Medium	1	2	3
Low	0	1	2
	Timeframe		
	Short	Medium	Long
High	2	3	4
Medium	1	2	3
Low	0	1	2
	Reversibility		
	Reversible	Irreversible	
High	2	4	
Medium	1	2	
Low	0	1	

Note: each component of significance is determined in relation to the size & severity of the impact.

Table 0-2: Levels of impact significance and their implications for the Project.

Score	Impact Significance Category	Implications for the Project
+	**Positive**	Impact will have an overall positive benefit upon receptors.
0	**Slight**	Impact is low and methods to avoid or mitigate the impact should be considered. Proposed methods must not compromise Project viability.
1-4	**Minor**	
5-6	**Minor/ Moderate**	
7 – 8	**Moderate**	Impact is moderate and may compromise the Project if not avoided or mitigated (i.e. significance should be reduced).
9-10	**Moderate/ Major**	
11 – 16	**Major**	Impact is unacceptably high and the Project is unlikely to be permitted for development if the impact is not avoided, mitigated, or offset (i.e. significance must be reduced).

Step 4. Understanding Certainty. The understanding of the certainty of potential impacts is an essential component of any robust impact assessment methodology. While the impact assessment methodology outlined above is quantitative, potential for uncertainty will always exist due to flexibility in design, inherent margins of accuracy in quantified approaches, quality and coverage of baseline data, uncertainty of risk, and the fact that impacts will occur within complex and dynamic natural systems. Certainty is determined using Table 0-3and is described through an overall confidence rating of High, Moderate, or Low; derived from professional opinions on the quality and consistency of available information and confidence of the likely effects that have been quantified.

Table 0-3: Assessment of Certainty

Impact Certainty	Quality and Coverage of Baseline Information		
	Low (no data)	Medium (data gaps)	High (good quality data)
Certain (>95%)	**Low Confidence**	**Moderate Confidence**	**High Confidence**
Probable (30-95%)	**Low Confidence**	**Moderate Confidence**	**Moderate Confidence**

Impact Certainty	Quality and Coverage of Baseline Information		
	Low (no data)	Medium (data gaps)	High (good quality data)
Unlikely (<30%)	Low Confidence	Low Confidence	Low Confidence

Step 5. Determining Mitigation. Mitigation is identified to eliminate or reduce impacts to an acceptable level. If impacts are minor, mitigation is still applied (where possible) to reduce impacts to an absolute minimum or to a positive impact.

To ensure successful implementation, mitigation measures are unambiguous statements of actions and requirements that are practical to execute. The following summarize the different approaches used in prescribing and designing mitigation measures:

- **Avoidance**: mitigation by not carrying out the proposed action on the specific site, but rather on a more suitable site;
- **Minimization**: mitigation by scaling down the magnitude of a development, reorienting the layout of the Project or employing technology to limit the undesirable environmental impact;
- **Restoration**: mitigation through the restoration of environments affected by the action; and
- **Compensation / offset**: mitigation through the creation, enhancement or acquisition of similar environments to those affected by the action.

Step 6. Determining Residual Impacts. Impacts are determined before mitigation and re-assessed after the implementation of mitigation following the approach described above for each individual impact. The post mitigation assessment effect is considered to be the likely effect of the Project as it is assumed that proposed mitigation will be adopted by the proponent. Where significant residual impacts or risks remain, further options for mitigation will be considered. Impacts will be re-assessed until they are within acceptable levels and as low as is technically and financially feasible.

Cumulative impacts

A cumulative impact relates to an activity that may be insignificant in isolation, but may become significant when added to existing and potential impacts from similar or other activities in the area. Potential cumulative impacts are considered within the impact assessment ratings and typically increase all factor scores influencing impact significance (where applicable).

APPENDIX 2: LEGAL FRAMEWORK

This Chapter summarises Oman's vision and national legislation as well as international conventions and guidelines relevant to the Project.

Oman Vision 2040

Oman's Vision 2040 (Omanuna, 2021) whilst not considered legislation nor a legal standard, provides valuable context in framing the Sultanate's national targets and priorities that aim to shape the country's regulatory and administrative framework. It is the Sultanate's objective to: overcome challenges, keep pace with regional and global changes, generate and seize opportunities to foster economic competitiveness and social well-being, stimulate growth, and build confidence in all economic, social and developmental relations nationwide. The Project is aligned with the Oman's vision 2040 and facilitates Economic Diversification and Private Sector Partnership to developing infrastructure that can compete globally.

National/sub-national laws, regulations and policies National environmental laws and regulations

The main national environmental and social laws and regulations relevant to the ESIA permitting process (as well as other environmental and social regulations) are listed in Table 0-1 and expanded upon in Table 0-2. In cases where a law or regulation is amended, the main regulation is cited with reference to an amendment (unless stated otherwise) in brackets. Please note that this is not an exhaustive list of all legislation. Only the key laws relevant to the Project are included, i.e. some laws and regulations may not be included in the below list. Marine laws have been included subject to confirmation of import of materials for the project.

Table 0-1: National environmental and social laws and regulations relevant to the ESIA permiting process

Royal Decrees (RD)
• RD 114/2001 Law for the Conservation of the Environment and the Prevention of Pollution • RD 6/2003 Nature Reserves and Wildlife Conservation. • RD 6/2004 Law on Nature Reserves and Wildlife Conservation (RD 6/2003, 2003) • RD 8/2003 Law of Grazing Lands and Animal Resources (Rangelands & Animal Wealth) • RD 15/1981 Territorial Sea and continental shelf

- RD 24/2007 Ratifying the Protocol on the Control of Maritime Transport and Disposal of Hazardous Waste and Other Waste Across the Borders
- RD 26/1981 Ratifying the London Dumping Convention 72 into Omani Law
- RD 28/1993 The Traffic Law
- RD 29/2000 Law for protection of water resources
- RD 29/2008 Oil Preparedness, Response and Cooperation, 1990
- RD 30/1991 Approval of Accession of Oman to the International Agreement on Rescue of 1989
- RD 34/1974 Marine pollution control law
- RD 35/1981 and amended by RD 12/1993 Issuing maritime law
- RD 35/2003 and RD 113/2001 Labor Law & Amendment
- RD 35/2019 The Law on Cultural Heritage (RD 41/2020)
- RD 37/2019 Responsibility of Conservation of Geological Heritage is the Ministry of Culture's
- RD 46/1995 Issuing the Law of Handling and Use of Chemicals
- RD 55/2002 Approval of Cartagena Protocol on Biological Safety Related to Biodiversity Convention
- RD 57/1994 1992 Protocol to the Establishment of International Fund for Compensation of Oil Pollution Damage, 1971
- RD 64/2006 Issuing a Law for Pesticides
- RD 67/2002 Sanctioning the Conservation of Wildlife and their Habitats in the GCC countries (RD 67/2002, 2002)
- RD 72/1991 Social Security Law
- RD 73/1992 Fighting Infectious Disease
- RD 73/1998 Law approving the Ratification by Sultanate of Oman to Vienna Convention for the Protection of Ozone Layer and Montreal Protocol concerning ODS
- RD 77/1996 Accession of the Sultanate to the Agreement on Implementing Section 11 of the UN Convention on the Law of the Sea, 1982
- RD 81/1999 Accession to Rotterdam Convention on Prior Informed Consent Practices for Certain Hazardous Chemicals
- RD 82/1977 Concerning the Use and Circulation of Explosives in the Sultanate
- RD 82/1988 Considering Water Stock as National Wealth
- RD 88/2002 Sanctioning Decision No. 3/1 Approved by Parties Conference of Basel Convention on Control of the Transboundary Movement of Hazardous and Other Waste and Their Disposal
- RD 90/1991 Marine Pollution from Land Sources
- RD 92/1984 International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, 1969 and its Protocol of 1973
- RD 93/1984 International Convention for Oil Pollution Damage, 1969 and its Protocol of 1976

- RD 94/1984 International Convention on the Establishment of International Fund for Compensation of Oil Pollution Damage, 1971
- RD 101/1996 Basic statute of Oman
- RD 105/2020 Establishing the Public Authority for Special Economic Zones and Free Zones and Determining Its Competences
- RD 114/2001 Issuing the law on conservation of the environment
- RD 115/2001 Law on Protection of Sources of Potable Water from Pollution
- RD 117/2004 Ratification of the Stockholm Convention on Persistent Organic Pollutants (POPs)
- RD 119/2011 Establishment of SEZAD

Ministerial Decision (MD)

- MD 3/1982 Issuing of Executive Regulations on Fishing and Protection of Marine Wealth Amended by MD 1686 and 23-89
- MD 4/1976 Protection of certain species and birds
- MD 4/1991 Sharing Responsibilities towards Implementing Marine Pollution Protocol
- MD 5/2017 Rules on Uprooting and removal of Ghaf Trees (Prosopis cineraria)
- MD 8/1984 Discharge of Industrial Water into Public Wastewater Networks
- MD 14/2017 Determining Fees for Obtaining Permits for Handling Chemicals
- MD 16/2001 Resolution Amending the Implementation Regulations on the Law of Marine Fishing and Protection of Aquatic Resources
- MD 17/1993 amended by MD 57/2002 Regulations for the management of the solid non-hazardous wastes
- MD 18/1993 Hazardous Wastes Management Regulations (MD 10/2017)
- MD 20/1990 Coastal Setbacks
- MD 20/1999 Issuing Permits to Handle Chemical Substances
- MD 20/2016 Regulations for the Management of Climate Affairs
- MD 25/2009 Regulations for the Organisation of Handling and Use of Chemicals
- MD 35/2013 Regulations for the Approval of Clean Development Mechanism (CDM) Projects under the Kyoto Protocol
- MD 41/2012 Rules for the Pesticide Law
- MD 42/1998 Amending the Implementing Regulations of Law on Marine Fishing and Protection of Living Aquatic Resources
- MD 48/2017 Regulating the Issue of Environmental Permits
- MD 50/2023 Issuing the Regulation Governing Hazardous Chemicals
- MD 51/2023 Issuing the Regulation Governing the Import and Transit of Hazardous and Non-Hazardous waste
- MD 56/2002 By-law for management of hazardous waste (promulgated via MD 18/1993)
- MD 79/1994 Regulations for noise pollution in the public environment

- MD 79/2006 Requirements for Underground Tanks for Storing Hydrocarbons & Hazardous Materials
- MD 79/2023 Issuing the Regulation for Radiation Protection and Safety and Security of Radiation and Radioactive Material
- MD 80/1994 Regulations for noise pollution in the working environment
- MD 81/2004 Regulating the Gathering of and Transportation of Wood
- MD 82/1977 Concerning Use of Explosives in the Sultanate and Its Amendments
- MD 101/2002 Regarding the prohibition of hunting, killing or catching wildlife
- MD 107/2013 Protection of the Ozone Layer (Replacing MD 243/2005, which superseded MD 37/2001)
- MD 107/2018 Energy Labelling and Energy Performance Requirements
- MD 110/2007 Law of Natural Reserves and Preservation of Wildlife
- MD 117/2013 Guidelines for the Preparation of Climate Affairs Chapter in the Environmental Impact Assessment Study for the Projects
- MD 118/2004 Control Regulations on Air Pollutants Emitted by Stationary Sources
- MD 145/1993 Regulations for wastewater re-use and discharge (see also RD 115/2001)
- MD 145/1993 and amendment MD 55/2002 and MD 12/2017 Regulations for wastewater reuse and discharge
- MD 159/2005 Discharge of liquid waste in the marine environment
- MD 169/2000 Control of the cutting of living vegetation
- MD 195/2001 Al Wusta Region Water Supply Wellfield Protection Zones
- MD 200/2000 Regulations Relating to the Establishment of Quarries (Crushers, Quarries and Transport of Sand from Coasts, Beaches and Wadis
- MD 209/1995 Compliance with Conditions of Environmental Permits
- MD 243/1997 Regulations for Organizing the Use of Water Desalination Units in Wells
- MD 248/1997 amended by MD 68/2000 Regulations for registration of hazardous chemical substances and the relevant permits
- MD 264/2000 amended by MD 3/2009 Regulations on wells and springs
- MD 316/2001 Banning the Use of Some Hazardous Chemical Substances
- MD 317/2001 Regulations for packing, packaging and labelling of hazardous chemicals
- MD 325/2019 Amendments on the Provisions of the Health Conditions Regulations for Activities related to Public Health
- MD 421/1998 Regulations for septic tanks and holding tanks MD 656/2011 Women Night Work Document)

ROP

- Civil Defence Law
- Fire Safety Requirements Part 1 - Buildings, Fire Prevention and Protection Requirements

- Fire Safety Requirements Part 2 - Vehicle Service Stations
- Fire Safety Requirements Part 3 - Transport, storage, Handling of Liquified Petroleum Gas
- Fire Safety Requirements Part 4 - Transport, Storage, Handling of Hazardous Materials
- Fire Safety Requirements Part 5 - Water Supplies for Fire-Fighting
- Weapons and Munitions Law
- Drugs Law
- Traffic Escort Rules (Decision No. 158/2015)

Omani Standards

- OS 8/2012 Unbottled Drinking Water Standard
- OS 189/1989 Drinking Water Sampling

RD/ MD No.	Legislation Description	Project Requirement
Principles of Environmental Management		
RD 06/2021 (formerly RD 96/101) Royal Decree No. 96/101, art. 5 (repealed)	Basic statute of Oman	▪ The conservation and protection of the environment, as well as the prevention of pollution is a social principle and responsibility of the State.
RD 114/2001	Conservation of the environment and prevention of pollution.	▪ Conserve resources. ▪ Avoid pollution. ▪ Implement environmental management procedures. ▪ Apply Best Available Techniques Not Entailing Excessive Costs (BATNEEC). ▪ Comply with requirements of Ministerial Decisions issued subsequent to Royal Decree 114/2001.
Environmental Approvals and Regulation		
MD 107/2023 (repealing MD 48/2017) RD 114/2001	Regulating the issue of Environmental Permits/Licence	▪ Project proponent to obtain an environmental permit prior to commencing project activities (An environmental permit will be issued for a max period of 3-years, renewable in the 34th month for another period of 3- years). ▪ Issuance and renewal of environmental permits for a Category A activity is OMR 900.
MD 209/1995	Fulfilment of conditions of environmental permits	▪ Ensure compliance with the conditions of environmental permits. ▪ Permit violations may result in fines and complete stoppage of Project activity until violation is resolved.

RD/ MD No.	Legislation Description	Project Requirement
MD 18/2012	Monitoring of emissions and submission of data to EA	▪ Report atmospheric emissions, including: CO_2, CH_4, N_2O, O_3, SO_x, NO_x, TSP.
Nature Conservation		
RD 6/2003 RD 8/2003 RD 67/2002 MD 110/2007	Protection of ecology and biodiversity	▪ Do not damage trees. ▪ Avoid damaging shrubs where possible. ▪ Do not kill any animals. ▪ Do not introduce non-native species
MD 169/2000 MD 128/1993 MD 5/2017	Protection of vegetation, in particular the cutting and felling of trees, notably *Prosopis cineraria* (Ghaf)	
RD 21/2017	Animal Welfare law	
MD 101/2002	Banning the killing or hunting of wild animals and birds	
MD 4/1976	Protection of certain species and birds	
Atmospheric Emissions		
MD 118/2004	Atmospheric emissions from stationary sources	▪ Ensure that any atmospheric emissions are compliant with MD 118/2004. ▪ Monitor emissions from stationary sources on a scheduled basis.
MD 20/2016	Minimise impact on climate change	Regulations for the Management of Climate Affairs: ▪ Obtain relevant licenses to emit greenhouse gases. ▪ Collection and reporting of greenhouse gas emissions. ▪ Use of Best available technologies to reduce greenhouse gas emissions.
MD 41/2017	Ambient Air Quality Standards	▪ Carry out ambient air quality monitoring as per the requirements of EA.

RD/ MD No.	Legislation Description	Project Requirement
MD 107/2013	Substances that deplete the ozone layer	▪ Ensure that the project does not use any substances that are banned or being phased out in accordance with the Montreal Protocol.
MD 107/2018	Energy Labelling and Energy Performance Requirements	▪ Ensure that air conditioning equipment brought to site complies with GCC Standard GSO 2530/2016 and is registered according to the Omani Energy Efficiency Ratio System.
Noise		
MD 79/1994 MD 80/1994	Noise emissions in the public and working environments	▪ Ensure that noise levels beyond a project perimeter fence are <70dB. ▪ Issue PPE as and where necessary.
Waste		
MD 77/1988	Public Health	▪ Dispose of wastes to a Municipality-approved waste site.
MD 17/1993	Non-hazardous wastes	▪ Do not mix non-hazardous with hazardous waste. ▪ Implement a consignment note system.
MD 18/1993 MD 10/2017	Hazardous wastes	▪ Segregate wastes by type. ▪ Dispose to a registered hazardous waste site or management company. ▪ Use licensed waste transporters only.
Wastewater		
RD 115/2001 MD 145/1993 MD 12/2017 MD 421/1998 MD 55/2002	Wastewater management and discharge	▪ Dispose of sewage to a Municipality-approved sewage treatment plant. ▪ Ensure treated effluent complies with required standard. ▪ Ensure septic tank and soakaway designs are compliant with design specifications. ▪ Obtain a permit for the re-use and discharge of produced water.

RD/ MD No.	Legislation Description	Project Requirement
Water use		
RD 29/2000 RD 115/2001 MD 192/2001 MD 195/2001 MD 243/1997 MD 264/2000	Protection of water resources and use of water supply wells	▪ Obtain water from an approved source. ▪ Ensure that activities do not threaten the integrity of water resources. ▪ Obtain relevant permissions prior to constructing a water supply well.
Soils and Topography		
MD 200/2000	Quarries and borrow pits	▪ Obtain approval from the local Municipality to excavate borrow pits.
Heritage and Culture		
RD 35/2019	The Law on Cultural Heritage	▪ Ensure archaeological & cultural heritage sites are not affected by project activities. ▪ Report any sites identified to the Ministry of Heritage and Culture. ▪ Obtain permission from the Ministry of Heritage and Culture before commencing project activities in areas where sites of archaeology and/or cultural heritage are known to be present.
RD 37/2019	Preservation of Geological Heritage	▪ Not known precisely at this time. The issue of the RD should indicate that prior to conducting earthworks in certain areas that it may be necessary to seek permission from MHC.
Chemicals and Radioactive Materials		
RD 46/1995 MD 248/1997 MD 25/2009 MD 317/2001 MD 79/2006 MD 14/2017 MD 281/2003	Import, distribution, use and disposal, permitting requirements, and storage of chemicals	▪ Ensure contractors have relevant permits in place for procurement and use of materials and ensure that the correct facilities are available for their safe storage and management. ▪ Ensure that the project does not use any banned materials and substances.
MD 249/97 MD 281/2003 RD 82/1977	Import, distribution, use and disposal, and storage radioactive materials (RAM), and explosives	▪ Ensure contractors have relevant permits in place for procurement and use of RAM and explosives and ensure that the correct facilities are available for their safe storage and management.
MD 249/1997	Regulations for the Control and	▪ The entry to the Sultanate of radioactive materials, or equipment that contains them shall only be by air

RD/ MD No.	Legislation Description	Project Requirement
	Management of Radioactive Materials (amended in parts by MD281/2003).	and it is prohibited transport them within the country except by land transportation. ▪ Permit to be obtained for the handling and use of radioactive materials. ▪ All radioactive sources should be returned to the manufacturer for disposal
MD 316/2001	Control of hazardous chemical materials.	▪ Ban the use and circulation of some hazardous chemical materials, including pcbs, brown asbestos, and blue asbestos.
MD 317/2001	Regulations for the packing, packaging and labelling of hazardous chemicals.	▪ Regulates the handling of chemicals.
Socio-economics / Health and Safety		
RD 35/2003 Amendments: RD 74/2006 RD 112/2006 RD 63/2009	Oman Labour law providing minimum standards and conditions of employment.	▪ Minimum standards and conditions of employment.
MD 234/2019 amending MD77/2002	Safety and fire protection requirements in buildings	▪ Each electrical units should be connected to a circuit breaker. ▪ Earthing connections should be carried out for each electrical unit independently. ▪ Maintenance crew should be trained and certified by the supplier of the equipment.
MD 286 / 2008	Occupational Health and Safety regulations and provisions for safe working practices and environments	▪ Occupational Health and Safety regulation of Oman provides minimum working standards and conditions, including provision of personal protective equipment and seasonal working hours.

International agreements and conventions

International environmental agreements and conventions that are ratified by Oman are listed in the below Table and are typically required by Royal Decree and by Good International Industry Practice (GIIP).

Table 0-2: Legislation passed ratifying international agreements

Convention, Protocol or International Agreement	Royal Decree
UN Convention to Combat Désertification	RD 5/1996
Ratifying the Protocol on the Control of Maritime Transport and Disposal of Hazardous Waste and Other Waste Across the Borders	RD 24/2007
Oil Preparedness, Response and Cooperation, 1990	RD 29/2008
Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture	RD 10/1997
Accession of the Sultanate to the Agreement on Implementing Section 11 of the UN Convention on the Law of the Sea, 1982	RD 77/1996
Approval of Accession of Oman to the International Agreement on Rescue of 1989	55/2002
United Nations Framework Convention on Climate Change provides greenhouse-gas-emissions mitigation, adaptation, and finance.	RD 28/2019
International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, 1969 and its Protocol of 1973	RD 92/1984
Oil Preparedness, Response and Cooperation, 1990. Requires that all appropriate measures are taken to prepare for and respond to oil pollution incidents.	RD 39-2008
Cartegena Protocol on the bio-safety of Biodiversity	RD 55/2002
Convention for the Safeguarding of Intangible Cultural Heritage	RD 56/2005
MARPOL (73/78) International Convention for the Prevention of Ship Pollution	RD 57/1994
MARPOL Convention for the Prevention of Pollution (signed 1973) 73/78 (Annexes I/II)	RD 25/1981
The London Dumping Convention	RD 26/1981
Joining the Joint Convention on the Safety of Spent Fuel Management and the Safety of Radioactive Waste Management	RD 27/2013
International Treaty on Plant Genetic Resources for Food and Agriculture	RD 57/2004
International Convention on Wetlands (Ramsar)	RD 64/2012
Convention, 1957 (No. 105) on the Abolition of Forced Labor, and the Convention, 1973 (No. 138) on the Minimum Age for Admission to Employment	RD 65/2005
Conservation of Wildlife and their Habitats in the GCC Countries	RD 67/2002
Convention on the protection of the world's culture and natural heritage (UNESCO's world heritage convention)	RD 69/1981

Vienna Convention on Ozone Layer Protection and Montreal Protocol on Ozone Depleting Substances	RD 73/1998 Amendments: RD 106/2004 MD 37/2001
Rotterdam Convention on application of the procedure for prior approval of certain harmful chemicals and pesticides used in international trade	RD 81/1999
Basel Convention for Control of Trans boundary Movements and Disposal of Wastes	RD 88/2002
Kuwait Protocol on the Protection of Marine Environment against Pollution from Land-Based Sources	RD 90/1991
Kyoto Protocol on Climate Change	RD 107/2004
Stockholm Convention on Persistent Organic Pollutants	RD 117/2004
Convention on International Trade in Endangered Species of Wild Fauna and Flora	RD 117/2007
Basel Convention for Control of Transboundary Movement of Hazardous Wastes	RD 119/1994
United Nations Framework Convention on Climate Change and Biological Diversity	RD 119/1994

APPENDIX 3 PERMIT, LICENCE AND AUTHORISATION SUMMARY

Permits and licences anticipated to be needed by the Project are listed in Table 0-1 in conjunction with corresponding national legislation. In all cases EA is the issuing authority and will facilitate communication with other issuing authorities if needed. Listed permits and licences that may be required during the Project cycle must be obtained as and where necessary; either by Client (where it relates directly to their registered activities) or by a licenced contractor (where authorisation is required to carry out a particular process or activity). Permits are required for both the EPC and Operations phases.

Table 0-1: Typical Environmental Permits, licenses and authorisations required for Projects (not all will be relevant to this project)

Permit Type*	Related Legislation
Environmental Licences	Resolution 107/2023 (Repeals MD 48/2017)
Climate Affairs Permit to Discharge Atmospheric Emissions	MD 18/2012 and MD 118/2004
Licence to operate a combustion source	MD 18/2012, MD 118/2004 & MD 41/2017
Non-Hazardous waste management and disposal	MD 17/1993
Hazardous Waste Disposal License	MD 18/1993 & RD 8/2011 (& 10/1982) and MD 10/2017
Non- Hazardous Waste Disposal Licence	MD 17/1993
Hazardous Chemical Registration Form (import, transport, store, use etc.)	RD 46/1995, MD 25/2009, RD 114 / 2001, MD 317/2001, MD 248/1997, and MD10/2017
Operating a desalination unit	MD 243/1997
Desalination Reject Water Disposal License	RD 114/2001, MD 145/1993 & MD 342/1997
License to transport hazardous waste (by waste management companies)	MD 18/1993 & RD 8/2011 and MD10/2017
Water Supply Well Permits	RD 29/2000, MD 264/2000
Permit to Discharge & Re-Use Wastewater	RD 114/2001, RD 115/2001, MD 145/1993, and MD12/2017
Sewage discharge including to local STP	MD 145/1993
Install and use a septic tank	MD 421/1998
Quarry and borrow pit permit	MD 200/2000

Permit Type*	Related Legislation
License to import, handle and dispose Ozone Depleting Substances ODS	MD 107/2013
Permission to fell trees and clear vegetation	RD 114/2001, MD 128/1993
Establish and operate campsites	MD 48/2017

Permit Type*	Related Legislation
Environmental Licences	Resolution 107/2023 (Repeals MD 48/2017)
Climate Affairs Permit to Discharge Atmospheric Emissions	MD 18/2012 and MD 118/2004
Licence to operate a combustion source	MD 18/2012, MD 118/2004 & MD 41/2017
Non-Hazardous waste management and disposal	MD 17/1993
Hazardous Waste Disposal License	MD 18/1993 & RD 8/2011 (& 10/1982) and MD 10/2017
Non- Hazardous Waste Disposal Licence	MD 17/1993
Hazardous Chemical Registration Form (import, transport, store, use etc.)	RD 46/1995, MD 25/2009, RD 114 / 2001, MD 317/2001, MD 248/1997, and MD10/2017
Operating a desalination unit	MD 243/1997
Desalination Reject Water Disposal License	RD 114/2001, MD 145/1993 & MD 342/1997
License to transport hazardous waste (by waste management companies)	MD 18/1993 & RD 8/2011 and MD10/2017
Water Supply Well Permits	RD 29/2000, MD 264/2000
Permit to Discharge & Re-Use Wastewater	RD 114/2001, RD 115/2001, MD 145/1993, and MD12/2017
Sewage discharge including to local STP	MD 145/1993
Install and use a septic tank	MD 421/1998
Quarry and borrow pit permit	MD 200/2000
License to import, handle and dispose Ozone Depleting Substances ODS	MD 107/2013
Permission to fell trees and clear vegetation	RD 114/2001, MD 128/1993
Establish and operate campsites	MD 48/2017

Additionally, the need for the following permits shall be investigated by OQ with relevant government departments (i.e. Royal Oman Police, Ministry of Health etc.) in the ESIA stage of the project:

- Permit for import, transportation, usage and storage of explosives (not expected to be required);
- No objection certificate for import, transportation, usage and storage of non-hazardous chemicals;
- No objection certificate for import, transportation, usage and storage of non-hazardous;
- Permit for import, transportation, usage and storage of radioactive material (not anticipated);
- Permit for storage, handling, transportation and disposal of hazardous waste (for onsite handling and storage prior to transport offsite);
- Extraction of water (not anticipated);
- Heavy / Oversize Load Transport (ROP).

Equator Principles 4

Principle requirements are outlined in the Equator Principles (2020). The same as OECD, EP classifies projects in 3 categories. Category A projects are "Projects with potential significant adverse environmental and social risks and/or impacts that are diverse, irreversible or unprecedented" (Equator Principles, 2020:1).

For category A project, Principle 2 requires undertaking an ESIA as well as include assessments of potential adverse Human Rights impacts and climate change risks. The Company should refer to the United Nations Guiding Principles on Business and Human Rights when assessing Human Rights risks and impacts, and the Climate Change Risk Assessment should be aligned with Climate Physical Risk and

Climate Transition Risk categories of the Task Force on Climate-Related Financial Disclosures (TCFD).

Furthermore, for Category A project, the Company will be required develop an Environmental and Social Management System along an Environmental and Social Management Plan (Principle 4), undertake effective stakeholder engagement and communication (Principle 5), establish and operate a Grievance Mechanism (Principle 6), project monitoring and reporting must be undertaken by an independent

Environmental and Social Consultant (IESC) or external expert (i.e. not directly tied to the Company/ proponent) (principle 9). Finally, the Company shall comply with the following reporting requirements in addition to the disclosure requirements in Principle 5 (Principle 10).

At a minimum, a summary of the ESIA must be accessible and available online and include a summary of Human Rights and climate change risks and impacts; Report publicly, on an annual basis, GHG emission levels (combined Scope 1 and Scope 2 Emissions, and, if appropriate, the GHG efficiency ratio) during the operational phase for Projects emitting over 100,000 tonnes of CO2 equivalent annually; and Share commercially non-sensitive Project-specific biodiversity data with the Global Biodiversity Information Facility (GBIF) and relevant national and global data repositories, using formats and conditions to enable such data to be accessed and re-used in future decisions and research applications.

IFC Performance Standards

IFC PS provide a framework to manage Project related environmental and social risks and impacts.

Implementation of IFC PS is intended to:

- promote and continuously improve sound and sustainable social and environmental performance;
- demonstrate improved financial, environmental and social outcomes;
- identify and assess environmental and social impacts;
- avoid, minimise and mitigate impacts wherever possible; and
- ensure appropriate engagement of interested and affected stakeholders.
- The applicability of the IFC PS with respect to site is detailed in the Table 0-2 below.

Table 0-2: IFC PS applicability to PV Development

IFC Performance Standard	Description	Application
PS 1: Assessment and Management of Environmental and Social Risks and Impacts	Performance Standard 1 establishes the importance of (i) integrated assessment to identify the environmental and social impacts, risks, and opportunities of projects; (ii) effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and (iii) the client's management of environmental and social performance throughout the life of the project.	**Applicable** as the project will require execution of the ESIA based on an accurate and recent baseline study, execution of impact assessment in line with recognised methodologies and where needed based on modelling work and development of suitable mitigation
PS 2: Labour and Working Conditions	Performance Standard 2 recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers. For any business, the workforce is a valuable asset, and a sound worker-management relationship is a key ingredient in the sustainability of a company. Failure to establish and foster a sound worker-management relationship can undermine worker commitment and retention and can jeopardize a project. Conversely, through a constructive worker-management relationship, and by treating the workers fairly and providing them with safe and healthy working conditions, clients may create tangible benefits, such as enhancement of the efficiency and productivity of their operations.	**Applicable** as the project will require a large workforce during construction and operations, perhaps with the presence of migrant workers. The ESIA shall undertake labour influx assessment and develop specific plans concerning labour and accommodation. The project will require development of project specific Labour Agreement detailing such topics as employment conditions, remuneration, benefits, etc. A labour GRM will be required to be developed by client, including HR policies. Labour related documents will be applicable on EPC Contractors and its subcontractors.
PS 3: Resource Efficiency and Pollution Prevention	Performance Standard 3 recognizes that increased economic activity and urbanization often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels. There is also a growing global consensus that the current and projected atmospheric concentration of greenhouse gases (GHG) threatens the public health and welfare of current and future generations. At the same time, more efficient and effective resource use and pollution prevention and GHG emission avoidance and mitigation technologies	**Applicable** in terms of energy efficiency, GHG, emissions and discharges. The IFC and WB EHS guidelines and sector specific guidelines will be used to determine the sector benchmark and practices for energy efficiency, emissions and discharges, solid and liquid waste management, handling of hazardous substances and contaminated land (if applicable).

IFC Performance Standard	Description	Application
	and practices have become more accessible and achievable in virtually all parts of the world. These are often implemented through continuous improvement methodologies similar to those used to enhance quality or productivity, which are generally well known to most industrial, agricultural, and service sector companies.	
PS 4: Community Health, Safety, and Security	Performance Standard 4 recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. In addition, communities that are already subjected to impacts from climate change may also experience an acceleration and/or intensification of impacts due to project activities. While acknowledging the public authorities' role in promoting the health, safety, and security of the public, this Performance Standard addresses the client's responsibility to avoid or minimize the risks and impacts to community health, safety, and security that may arise from project related activities, with particular attention to vulnerable group.	**Applicable** due to the risks to community health, safety and security. The project design shall be compliant with GIIP and sector benchmark. The following aspects will require assessment and development of mitigation measures: e.g., during construction phase of the project: community health and safety due to labour influx, use of ecosystem services, traffic and risks connected to abnormal loads transportation. e.g., wind turbines during the construction phase of the project: community health and safety is relevant due to potential impacts from transportation movements.
PS 5: Land Acquisition and Involuntary Resettlement	Performance Standard 5 recognizes that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood) as a result of project-related land acquisition and/or restrictions on land use. Resettlement is considered involuntary when affected persons or communities do not have the right to refuse land acquisition or restrictions on land use that result in	**Not-applicable** resettlement is not foreseen by the project. The project will not cause physical or economic displacement.

IFC Performance Standard	Description	Application
	physical or economic displacement. This occurs in cases of (i) lawful expropriation or temporary or permanent restrictions on land use and (ii) negotiated settlements in which the buyer can resort to expropriation or impose legal restrictions on land use if negotiations with the seller fail.	
PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Performance Standard 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. The requirements set out in this Performance Standard have been guided by the Convention on Biological Diversity, which defines biodiversity as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems."	**Potentially Applicable** due to the wind turbines potentially impacting birds. The above shall be further investigated during the baseline data collection and assessed in the ESIA stage of the project. Endemic flora had also been identified at the proposed site.
PS 7: Indigenous Peoples	Performance Standard 7 recognizes that Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population. In many cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development. Indigenous Peoples are particularly vulnerable if their lands and resources are transformed, encroached upon, or significantly degraded. Their languages, cultures, religions, spiritual beliefs, and institutions may also come under threat. As a consequence, Indigenous Peoples may be more vulnerable to the adverse impacts associated with project development than non-indigenous communities. This vulnerability may include loss of identity, culture, and natural resource-based livelihoods, as well as exposure to impoverishment and diseases.	**Not applicable.**

IFC Performance Standard	Description	Application
PS 8: Cultural Heritage	Performance Standard 8 recognizes the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that clients protect cultural heritage in the course of their project activities. In addition, the requirements of this Performance Standard on a project's use of cultural heritage are based in part on standards set by the Convention on Biological Diversity.	**Not Applicable**, due to absence of potential cultural artefacts identified during the scoping stage of the project.

World Bank and IFC EHS Guidelines General and Industry Specific Guidelines

World Bank Group / IFC EHS Guidelines provide technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). General IFC EHS Guidelines (2007) provide generic information on environmental, health, and safety issues potentially applicable to the Project with performance levels and measures that are generally considered achievable in new facilities at reasonable cost through existing technologies.

APPENDIX B EA'S LOCAL ENVIRONMENTAL PERMIT AND CONDITIONS (IN RESPONSE TO ESIA A)

Commercial Registration Information — بيانات السجل التجاري

Registration Number	**1244846**				رقم السجل التجاري
Registration Name	OQ ALTERNATIVE ENERGY		اوكيو للطاقة البديلة		اسم السجل التجاري
Legal Type	Limited Liability Company		شركة محدودة المسؤولية		الشكل القانوني
Registration Status	Active - نشط	حالة السجل	**Registration Date**	14/02/2016	تاريخ التسجيل
Foreign Investment	Yes - نعم	إستثمار اجنبي؟	**Expiry Date**	23/02/2026	تاريخ الانتهاء

Places of Activities — أماكن ممارسة الأنشطة

Reg. Date	06/07/2024	تاريخ التسجيل	**POA Code**	**46255801**	رمز الفرع
Validation		فترة الصلاحية	**Rent Contract**		رقم العقد
Project Name					اسم المشروع
Location	Adam / Adam / Al Dakhiliyah Governorate		ادم / أدم / محافظة الداخلية		الموقع
Address					العنوان
GPS Coordinates	**Longitude**	خط الطول	**Latitude**	خط العرض	الإحداثيات

License Information — بيانات الترخيص

License Number	**L2707746**				رقم الترخيص
License Name	توليد وتوزيع الطاقة الكهربائية (البلديات) Generation and Distribution of Electric Power (Municipalities)				اسم الترخيص
Period (Months)	12	مدة الترخيص (بالشهور)	**First Register**	06/07/2024	الإصدار الاول
Expiry Date	05/07/2025	تاريخ الإنتهاء	**Issuing Date**	06/07/2024	تاريخ الإصدار
License Definition	LD-15772 13	تعريف الترخيص	**License Status**		حالة الترخيص
Issued By	وزارة التجارة والصناعة وترويج الاستثمار - التراخيص التجارية Ministry of Commerce Industry and Investment Promotion - Commercial License				الجهة المرخصة
Approvers By	Civil Defence and Ambulance Authority	هيئة الدفاع المدني والإسعاف			الجهات
	Environment Authority	هيئة البيئة			
	Ministry of Interior	وزارة الداخلية			

Info@tejarah.gov.om | Call Centre +968 80000070 | P.O. Box: 550 | PC: 100

License Number L2707746 رقم الترخيص

Activities Covered by the License الأنشطة التي يشملها الترخيص

Activites Description	LIC. Date - تاريخ الترخيص	وصف الانشطة
351001:Electric power generation	06/07/2024	351001:توليد الطاقة الكهربائية

Info@tejarah.gov.om | Call Centre +968 80000070 | P.O. Box: 550 | PC: 100

License Number	L2707746	رقم الترخيص

بيانات عامة

اسم المشروع	اوكيو للطاقة البديلة
اسم المدير المسؤول عن المشروع	مهند الكيومي
رقم هاتف الشخص المسؤول	99380708
الهدف من المشروع	حسب الدراسة البيئية المرفقة

بيانات شركة الاستشارات البيئية

يرجى تعبئة هذا الجزء في حالة وجود دراسة تقييم التأثيرات البيئية (EIA)

رقم السجل التجاري	
اسم الشركة	
رقم الترخيص البيئي	
تاريخ الترخيص البيئي	
رقم الهاتف	
البريد الالكتروني	

احتياجات المشروع من المرافق والبنية التحتية والطاقة اللازمة لعمليات التشغيل

الطاقة اللازمة لعمليات التشغيل

الكهرباء (كيلو واط/ساعة)	الغاز (متر مكعب/السنة)	الديزل (لتر/السنة)	المياه (المصدر - الكمية)

احتياجات المشروع من المرافق والبنية التحتية

نوع المرفق	الوصف
0	

المواد الخام والمواد الكيميائية

تنبيه: تعبئة حقول هذا الجدول إلزامي

المواد الخام الداخلة في عمليات التصنيع (بما في ذلك مواد التغليف)

المواد الخام	المصدر	الكمية السنوية	الوحدة

المواد الكيميائية المستخدمة في المشروع (يرفق نشرات بيانات السلامة الكيميائية)

نوع المادة	اسم المادة	التركيب الكيميائي	الكمية

توضيح وسائل نقل وتداول وتخزين المواد الخام والكيماويات والوقود والمنتج النهائي	حسب الدراسة البيئية المرفقة

التأثيرات البيئية

التأثيرات المتوقعة على الإنسان والمباني والهياكل الإصطناعية	حسب الدراسة البيئية المرفقة
التأثيرات المتوقعة على النباتات والحيوانات	حسب الدراسة البيئية المرفقة
التأثيرات المتوقعة على الأرض	حسب الدراسة البيئية المرفقة
التأثيرات المتوقعة على المياه	حسب الدراسة البيئية المرفقة
هل سيتم استخدام مواد أو أجهزة تحتوي على مواد مشعة	لا

في حالة إستخدام مواد مشعة يجب الحصول على تصريح من وزارة البيئة والشؤون المناخية

المخلفات الصلبة (الخطرة والغير خطرة) ومياه الصرف والمياه السطحية

مرحلة المشروع	نوع التأثير	الأسم / المصدر	الكمية	وسيلة التحكم/ المعالجة	الموقع / اسلوب التصريف النهائي
0	0				

License Number **L2707746** رقم الترخيص

التأثيرات المتوقعة على جودة الهواء (إنبعاثات ملوثات الهواء من المصادر الحالية أو المستقبلية)

مرحلة المشروع	مصادر وطبيعة الإنبعاثات	الكمية	وسيلة التحكم/ المعالجة	التصريف النهائي (وضح ارتفاع المدخنة وارتفاعها)	رصد/نماذج تشتت الإنبعاثات
0					

مصادر ومستويات الضوضاء والتذبذب

طبيعة المصدر	نوع الضوضاء والتذبذب	المستوى (بالديسيبيل)
0		

تأثير المواد الكيميائية السامة والخطرة

المصدر والطبيعة	الكمية	وسيلة التحكم/ المعالجة	الموقع / اسلوب التصريف النهائي	خزانات ومرافق تخزين المرافق الكبيرة

المتفجرات (أن وجدت)

الأسم	النوع	الغرض من الاستخدام	الكمية	فترة الاستخدام (بالشهر)

إذكر إجراءات التخفيف وبرامج الرصد

متطلبات القوى العاملة (التصنيف الوظيفي)

عدد الأشخاص الذين يستخدمون الموقع اثناء عمليات التشييد

عدد الأشخاص الذين يستخدمون الموقع اثناء عمليات التشغيل

1. إداري عماني	2. فني عماني	3. مجموع القوى العاملة العمانية (1+2)	4. إداري غير عماني	5. فني غير عماني	6. مجموع القوى العاملة الغير العمانية (4+5)

بيانات أيام العمل والورديات

فترات التشغيل

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تعهد: يقر مقدم الطب بأن البيانات الواردة في هذا الطلب صحيحة ودقيقة ويتحمل المسؤولية الكاملة إذا ثبت خلاف ذلك.

الإشتراطات البيئية الخاصة لمشروع توليد الطاقة الشمسية الكهروضوئية

أولا: بيانات الشركة

رقم المشروع: LIC2707746	**رقم السجل التجاري:** ١٢٤٤٨٤٦
اسم المشروع : محطة الطاقة الشمسية الكهروضوئية	
المالك: أوكيو للطاقة البديلة	
الموقع: محافظة الداخلية / ادم - قرن العلم	
رقم النشاط : ٣٥١٠٠١	**الفئة :** أ
رقم التواصل : ـــ	

ثانياً: الإشتراطات العامة

1- يجب على مالك المشروع الإلتزام التام بمواد الائحة الخاصة بتنظيم استصدار التصاريح البيئية رقم (٢٠٢٣/١٠٧)، كما يجب على الشركة التقيد التام وفي كل الأوقات بالقوانين واللوائح التنفيذية التابعة لهيئة البيئة والمتعلقة بالمشروع.

2- لا يمكن إجراء أي تغيير في تفاصيل المشروع أو إضافة أية وحدات دون الرجوع إلى هذه الهيئة والحصول على الموافقات المطلوبة.

3- يجب على الشركة زيادة المسطحات الخضراء في المنطقة وفق الظروف البيئية المحلية.

4- يجب على الشركة في حال تواجد كثافة شجرية في الموقع تعويضها بزراعة ضعف الأشجار , وفي حال وجود أشجار معمرة فأنه يجب على الشركة نقلها إلى موقع أخر .

5- يجب على الشركة استخدام وسائل وتقنيات مناسبة لتحسين كفاءة الطاقة وترشيد استهلاكها في وحدات ومرافق المشروع إلى أقصى حد ممكن.

6- يجب على الشركة التحكم في انبعاث الملوثات والغبار والأتربة والروائح الكريهة ومصادر الازعاج الناتجة من عمليات الحفر والشحن والتفريغ وتخزين المواد والمخلفات وذلك باستخدام أفضل الممارسات البيئية المناسبة وفقا للاسس والضوابط التي تقررها الهيئة في هذا الشأن.

7- يجب على الشركة قبل البدء في مرحلة الإنشاء تعيين مسؤولاً بيئياً مؤهلاً، وأن تملك دائرة خاصة بالبيئة والصحة والسلامة بحيث تكون هذه الدائرة مسؤولة عن تنفيذ خطة الطوارئ البيئية وتوصيات دراسة التأثيرات البيئية وتقارير الرصد البيئي للعناصر والملوثات الناتجة من وحدات ومرافق المشروع بالإضافة إلى التأكد ومتابعة تطبيق اشتراطات هذا التصريح البيئي والتراخيص التي تتبعه والإلزام بها.

8- يجب على الشركة بعد مرور ثلاث سنوات من تشغيل المشروع أو عند حدوث حالات للتلوث البيئي أو ظهور مشكلات بيئية مستمرة أن تقوم بتكليف استشاري بيئي مسجل لدى الهيئة لإعداد دراسة المراجعة والتدقيق البيئي على المشروع من أجل تقييم الوضع

البيئي القائم في جميع عمليات ومرافق المشروع، ويتم تحـديد التأثيرات والمخاطر البيئية الناتجة عنها، واقتراح أفضـل الممارسـات البيئية المسـتدامة للحد من التأثيرات الناتجة من المشروع أو تقليلها إلى أقصى حد ممكن.

9- تتحمل الشركة كافة المسؤوليات والتبعات بشكل كامل عن أي تأثيرات بيئية أو أضرار أو مخلفات أو مشوهات تحدث أثناء مرحلتي إنشاء وتشغيل المشروع بما في ذلك تكاليف التخفيف والمعالجة.

10- يجب على الشـركة إخطار هذه الهيئة في حالة وقوع أي حادثة بيئية مثل انبعاث ملـــوثات الهواء والغبار أو الدخان أو الضوضاء أو الروائح الكريهة أو التسربات الناتجة من وحدات ومـرافق المشروع ، مع قيامها بإصلاح الخلل في أقرب فرصة ممكنة ، وموافاة هذه الهيئة لاحقا بتقرير تفصـيلي حول أسـباب ومبررات وقوع الحادثة وخطة العمل التي ستقوم بها الشركة لمنع تكرار مثل هذه الحادثة مستقبلا أو تقليلها الى اقصى حد ممكن وفقا للاسس والضوابط التي تقررها الهيئة في هذا الشان.

11- يجب على الشركة تقديم خطة إغلاق الموقع وذلك بعد الانتهاء من استخدامه.

12- يجب على الشركة أن تقوم بتضمين جميع الاشتراطات الواردة في هذه الموافقة في شروط التعاقد الخاصة بالمقاولين المشتركين في تنفيذ المشروع.

13- مع عدم الإخلال بأي عقوبة أشد ينص عليها قانون حماية البيئة ومكافحة التلوث او أي قانون أخر ، تعاقب الشركة في الحالات التالية:

أ- عدم التزام الشركة بتنفيذ الاشتراطات البيئية الواردة في هذا التصريح خلال فترة سريانها.
ب- عدم قيام الشركة بتوفير المستندات أو المعلومات أو الاستيضاحات المطلوبة بشأن المشروع من الدوائر المختصة في هذه الهيئة.
ت- قيام الشركة بالتوسع بالمشروع أو نقله إلى موقع آخر غير المصرح به دون الحصول على موافقة الهيئة والجهات الحكومية المختصة .
ث- نقل هذا التصـريح البيئية الى شـخص آخر اوجهة أخرى دون الحصـول على موافقة الهيئة والجهات الحكومية المختصة.

14- يحق للهيئة تعديل أو إضـافة أية اشـتراطات بيئية للمشـروع في أي وقت مع إبلاغ الشـركة بالتغيير، ويجب عليها الإلتزام بتنفيذ التعديلات والتغييرات المطلوبة وفقا للأسس والضوابط التي تقررها الهيئة في هذا الشأن.

ثانيا: الاشتراطات الخاصة بالمشروع

15- يجـب أن تكـون أرضـية موقـع المشـروع مغطـاه بالخرسـانة المسـلحة لمنـع تسـرب الملوثـات إلـى الأرض مـن الأمـاكن المحتملـة للتلـوث مثـل مولـدات الـديزل والمحطات الكهربائية .

16- يجب على الشركة الالتزام التام بجميع ما ذكر في دراسة التأثيرات البيئية و خطة الادارة البيئية التي تم ارفاقها مع الطلب.

17- يجب صيانة الألواح الشمسية بصفة مستمرة.

18- يجب انشـــاء المحولات الكهربائية التي تحتوي على زيوت على ارضـــيات مبطنة مع الالتزام بتوفير معدات مكافحة التسرب في الموقع.

19- يجب إستعمال التنظيف الجاف لتنظيف الألواح الشمسية وعدم استخدام الماء .

انتهى ,,,

والله ولي التوفيق ،

Special Environmental Requirements for **Solar Power Generation Project**

General requirements

1. The company must fully comply with the provisions of the regulation (107/2023) issued by the Environmental Authority related to the project. Any changes to the project details or the addition of any units must not be made without consulting the Authority and obtaining the necessary approvals.
2. No modifications to project details or additions of any units should be made without consulting the Authority and obtaining the required approvals.
3. The company must increase green spaces to match local environmental conditions.
4. The company must compensate for the damage caused by the planting of harmful trees in the site. If there are perennial trees, the company must relocate them to another site.
5. The company must use appropriate means and techniques to enhance energy efficiency and reduce consumption in the project's units and facilities to the maximum extent possible.
6. The company must control the emission of pollutants, dust, unpleasant odors, and other environmental nuisances from storage and handling areas, and adhere to environmental practices and regulations established by the Authority.
7. Before starting construction, the company must appoint a qualified local environmental qualified personal, responsible for implementing a comprehensive environmental, health, and safety plan. This qualified personal will oversee environmental impact assessments, emergency response plans, and ensure compliance with this permit's requirements.
8. The company must appoint a registered environmental consultant to conduct a review and audit of the project every three years after operation or when environmental issues arise, and submit the findings to the Authority for evaluation.
9. The company is responsible for any environmental impacts, damages, or complaints resulting from the project, including the costs of mitigation and remediation.
10. The Company shall notify the Authority in the event of any environmental incident involving the emission of air pollutants, dust, smoke, noise, odours or leaks from the Project's premises and facilities, and shall rectify the defect at the earliest opportunity and provide the Authority with a detailed report on the severity and severity of the incident and the action plan undertaken by the Company to prevent the recurrence of this incident independently or to minimise it as far as possible in accordance with the rules and regulations approved by the Authority in this regard.
11. The company must submit a site closure plan upon project completion.
12. The company must include all these environmental condetions , in the contract requirments and the SOW of all contractors who will be involved in the excution of the project.
13. "The company must adhere to all environmental protection laws and regulations, and is subject to penalties for non-compliance. On the following situations:

a. The company's failure to implement the environmental requirements contained in this permit during its validity period.

b. The company's failure to provide the documents, information or clarifications required regarding the project from the competent departments in this authority.

c. The company's expansion of the project or its transfer to another location other than the authorized one without obtaining the approval of the authority and the competent government agencies.

d. Transferring this environmental permit to another person or other destinations without obtaining the approval of the authority and the competent government agencies."

14. The Authority reserves the right to amend or add any environmental requirements and the company must comply with such changes.

Project specific requirements

15. Soil from areas where there are potential sources of contamination such as substations and diesel generators, as well as other potential sources of contamination shall be covered with reinforced concrete, in order to prevent the seepage of contaminants into the ground.

16. The company must adhere to the environmental management plan and mitigation measures outlined in the environmental impact assessment.

17. Solar panels and batteries must be maintained on a regular basis.

18. Electrical transformers containing oils must be installed on the site with adequate anti-leakage equipment.

19. Solar panels must be dry-fitted and waterproofed.

APPENDIX C PROJECT'S APPLICABLE LEGAL FRAMEWORK

CONTENTS

LIST OF TABLES

1. APPLICABLE NATIONAL ENVIRONMENTAL & SOCIAL LEGAL FRAMEWORK

1.1 BIODIVERSITY

1.1.1 LEGISLATION ON PROTECTION OF ECOLOGY AND BIODIVERSITY

RD 114/2001, known as the Environmental Protection and Pollution Control Law, serves as a cornerstone of Oman's environmental legislation. It establishes a comprehensive framework for environmental regulation, setting forth principles, guidelines, and standards designed to protect and conserve the environment while promoting sustainable development.

The law highlights key wildlife species to emphasize their protection and imposes penalties for violations such as hunting. These protected species include:

TABLE 1.1 KEY SPECIES PROTECTED BY LAW

Category 1	Category 2
• Arabian Oryx (*Oryx leucoryx*) • Arabian Leopard (*Panthera pardus*) • Arabian Tahr (*Hemitragus jayakari*) • Reem (Sand Gazelle) (*Gazella subgutturosa*) • Arabian Gazelle (*Gazella gazella*) • Nubian Ibex (*Capra aegagrus*) • Caracal Lynx (*Felis caracal*) • Striped Hyena (*Hyaena hyaena*) • Wild Cat (*Felis silvestris*) • Arabian Wolf (*Canis lupus*) • Honey Badger (*Mellivora capensis*) • Sand Cat (*Felis margarita*) • Sand Fox (*Vulpes rueppellii*) • Masirah Hare (*Lepus capensis*) • Hawksbill Turtle (*Eretmochelys imbricata*) • Houbara Bustard (*Chlamydotis undulata*)	• Red Fox (*Vulpes vulpes arabica*) • Green Turtle (*Chelonmia mydas*) • Loggerhead Turtle (*Caretta caretta*) • Olive Ridley Turtle (*Lepidochelys olivacea*) • All species of falcons, owls, eagles, vultures, flamingos, pelicans, gulls, and terns • All mammal species not listed in the Category 1, excluding domesticated mammals

The newly issued EA Decision 13/2021 outlines a comprehensive framework for regulating the possession and use of hunting tools, tracking devices, and equipment designed to simulate the sounds of wild birds and animals. It strictly prohibits the use of such equipment unless specifically authorized by EA for regulatory, scientific, or research purposes.

Permits for these tools and devices will be issued based on a thorough evaluation by the Authority's specialists, considering the intended use of each application on a case-by-case basis. The permit is valid for one year and requires renewal before expiration; if renewal is not desired, the authorized equipment must be returned to EA or the original importer if borrowed.

There are other regulations that are applicable to the Project in term of conservation of ecology and biodiversity, that include: not damaging trees, avoid damaging shrubs where possible, not to kill animals, not introducing non-native species (RD 114/2001, RD 67/2002, RD 6/2003, RD 8/2003, MD 110/2007); the protection of vegetation, in particular the cutting and felling of trees, notably *Prosopis cineraria* (MD 128/1993, MD 169/2000, MD 5/2017); and the banning of killing or hunting of wild animals and birds (MD 101/2002).

1.2 AIR QUALITY & EMISSIONS

1.2.1 NATIONAL AIR QUALITY STANDARDS & EMISSIONS

1.2.1.1 NATIONAL AMBIENT AIR QUALITY STANDARDS

The Ambient Air Quality Regulation (MD 41/2017) was introduced in 2017 and stipulates ambient air quality standards (Table 1.2).

TABLE 1.2 AMBIENT AIR QUALITY STANDARDS (MD 41/2017)

Pollutant	Symbol	Maximum Level of Pollutant Concentrations		Average Pollutant Measurement Period
		ppm	µg/m³	
Sulphur Dioxide	SO_2	0.124	350	Hour
		0.0532	150	24 hours
Hydrogen Sulphide	H_2S	0.020	30	Hour
Nitrogen Dioxide	NO_2	0.123	250	Hour
		0.642	130	24 hours
Ozone	O_3	0.0568	120	8 hours
Particulate Matter 10 Microns	PM_{10}	-	150	24 hours
Particulate Matter 2.5 Microns	$PM_{2.5}$	-	65	24 hours
Carbon Monoxide	CO	24.3	30 mg/m³	Hour
		8.11	10 mg/m³	8 hours
Non-methane Hydrocarbon	NMHC	0.24	160	3 hours
Lead	Pb	-	1.5	3 months
Ammonia	NH_3		200	24 hours

1.2.1.2 NATIONAL SOURCE EMISSION STANDARDS

Air quality related to a permanent stationary source with a permanent stack or chimney is typically regulated through the air quality law (MD 118/2004). General requirements state that, 'Dark smoke products of combustion shall not emit smoke as dark or darker than shade 1 on the Ringlemann Scale (20% opacity),' and that grit and dust emissions should not exceed the maximum permissible limit of 50 mg/m³.

1.2.2 INTERNATIONAL AIR QUALITY STANDARDS AND EMISSIONS

The IFC Environmental, Health and Safety General (EHS) Air Emissions and Ambient Air Quality, which refers to the WHO Ambient Air Quality Guidelines, set international standards relating to the air quality standard as shown in Table 1.3. IFC Guideline reports that "Emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards by applying national legislated standards, or in their absence, the current WHO Air Quality Guidelines".

TABLE 1.3 WHO AMBIENT AIR QUALITY GUIDELINES

Pollutant	WHO / IFC Value	Averaging Period
Sulphur Dioxide (SO_2)	500	10 min
	-	1 hr
	20	24 hr
Nitrogen Dioxide (NO_2)	200	1 hr
	-	24 hr
	40	Annual
Particulate Matter 10 micrometers (PM_{10})	50	24 hr
	20	Annual
Particulate Matter 2.5 micrometers ($PM_{2.5}$)	25	24 hr
	10	Annual
Carbon Monoxide (CO)	-	1 hr
	-	8 hr
Ozone (O_3)	100	8 hr

1.2.3 AIR QUALITY & EMISSION LIMITS APPLICABLE TO THE PROJECT

As required by the IFC standard, the project will comply to the National Air Standard.

1.3 NOISE

1.3.1 NATIONAL NOISE LEGISLATION

National noise legislation includes MD 79/94 and MD 80/94 (regulations for noise pollution control in the public / working environment respectively).

1.3.1.1 NOISE POLLUTION CONTROL IN THE PUBLIC ENVIRONMENT (MD 79/94)

Noise pollution control in the public environment is controlled through MD 79/94 which identifies noise sources attributable to operations, namely noise associated with construction work itself. The Ministerial Decisions contain the following articles that are pertinent to the Project:

Article 2: External Noise Sources are:

a. *Industrial plants and public works: Include factories, similar commercial facilities, and the like as well as the works of assembling, dismantling and repair. It will also include public works, power plants and installation for extraction, pumping and refining of water, oil, gas, sewage treatment etc.*

MD 79/94 also defines the weighting and the reference level for the noise measurements being taken, lists penalties to be included for tonal or impulse noise, and defines the three sub-daily reference periods. The corresponding articles from MD 79/94 are listed below:

Article 3: Public noise shall be described in terms of emission values expressed by the equivalent continuous A -weighted sound pressure level over relevant time intervals, in decibels relative to 20 micro pascals.

Article 4: For noise of tonal or impulse character, an adjustment shall be made to the measured or calculated value of the equivalent continuous A -Weighted sound pressure level of the noise. This shall be as follows:

a. *For tonal noise, the adjustment shall be 5 dB (A).*
b. *For impulse noise, the adjustment shall be 5dB (A).*
c. *For the noise of combined tonal and impulse character the adjustment shall be 7 dB (A).*

Article 6: For noise from sounds described in items a, b, and c of Article (2), the time limits of noise occurring in specific parts of the day and night for working days versus holidays shall be as follows:

a. *Workdays - daytime (A): After seven a.m. up to six p.m. LMT*
b. *Workdays- Evenings (B): After six. p.m. up to eleven p.m. LMT*
c. *Holidays and Nights (C): After eleven. p.m. up to seven a.m. LMT*

Article 7: The limits of noise generated from the sources enlisted in item (a) of Article (2), in terms of equivalent continuous A-weighted sound pressure level over each particular time period A, B, C as defined in Article (6) shall be:

Legislative limits for A-weighted, time averaged equivalent noise level (as a result of construction activities) are defined in Table 1.4 with the relevant district type (industrial) highlighted in bold.

TABLE 1.4 NATIONAL AMBIENT NOISE LIMITS

Type of District	Leq, T, dB (A) Over Time Period		
	A	B	C
Rural Residential Recreational	45	40	35
Suburban Residential	50	45	40
Urban Residential	55	50	45
Urban Residential with Some Workshops or Business; City Hub	60	55	50
Industrial and Commercial	**70**	**70**	**70**

1.3.1.2 NOISE POLLUTION CONTROL IN THE WORKING ENVIRONMENT (MD 80/94)

Noise pollution control in the working environment is controlled through the MD 80/94. Article 4 defines the legislative exposure limit of workers on site to an A-weighted, time averaged equivalent noise level of 85 dB(A).

1.3.2 INTERNATIONAL GUIDELINES FOR NOISE

The IFC Environmental, Health and Safety General (EHS) Guidelines for Noise, which refers to the WHO Guidelines for Community Noise, set international noise standards relating to noise from industrial plants at the property line and in residential areas.

The IFC HSE guidelines prescribe an absolute noise level of 55 dB(A) during the daytime and 45 dB(A) during nighttime value in residential areas. For industrial area, the applicable noise level is 70 dB(A) at the boundary of an industrial property. These limits refer to noise from facilities and stationary noise sources and are commonly applied as design standards for industrial facilities. Moreover, according to IFC guidelines, the Project should not result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site. The IFC standards are summarized in Table 1.5.

TABLE 1.5 IFC ENVIRONMENTAL HEALTH AND SAFETY GUIDELINES FOR NOISE

Receptor	Maximum permissible noise limits dB(A) (Leq)	
	Daytime (07:00 – 22:00)	Night-time (22:00 – 07:00)
Residential, institutional and educational	55	45
Industrial and commercial	70	70

Source: IFC Environmental, Health and Safety (EHS) General Guidelines, 2012

1.3.3 NOISE LIMITS APPLICABLE TO THE PROJECT

The area where the project is located will be classified as “industrial area”, whereas the surrounding environment and the nearest settlements can be classified as “rural residential areas”.

The Project will apply the most stringent noise limits set by national and IFC standards, as follows:

- during daytime, 55 dB(A) for residential areas (national and IFC standards) and 70 dB(A) for industrial areas (national and IFC standards);
- during evening, 50 dB(A) for residential areas (national standards) and 70 dB(A) for industrial areas (national and IFC standards);
- during night-time, 45 dB(A) for residential areas (national and IFC standards) and 70 dB(A) for industrial areas (national and IFC standards).

1.3.4 WASTE MANAGEMENT

1.3.4.1 MANAGEMENT OF SOLID NON-HAZARDOUS WASTE (MD 17/1993)

Solid non-hazardous waste is classified as any solid material or semi solid which does not have any danger to the environment or human health (if it is dealt with in a safe scientific way) and can include:

- Household waste (solid non-hazardous materials generated by domestic activities);

- Solid materials or semi solid material discarded or produced from residential, commercial, industrial, agricultural, and other activities;
- Construction and demolition debris;
- Metal scrap such as discarded motor vehicles;
- Dewatered sludge from domestic, industrial, or agricultural wastewater treatment that contains no toxic constituents in concentrations in excess of those acceptable within the terms of wastewater regulations; and
- Slag and ashes from incineration processes that have an available toxic content within the criteria applied to the characterization of dewatered sludge from wastewater treatment.

The MD contains the following articles pertinent to the Project site:

Article 2: Occupants of premises used for residential, commercial, industrial, agricultural or other purposes shall store and dispose solid non-hazardous waste in accordance with the provisions of these Regulations and the decision of the Concerned Authority to this effect, such that there is no nuisance or hazard to the public health.

Article 3: The Concerned Authority shall establish a suitable system for the collection, storage and transport of all solid non-hazardous waste arising within its specialized area towards all residential complexes, other than residential complexes of less than 500 inhabitants which can be excluded by a decision from the Minister, provided that no nuisance or hazard to the public health is risked thereby.

Article 5: The user of commercial, industrial, agricultural or any other sites that produce solid non-hazardous waste except domestic waste, shall collect these wastes and transport it in a safe manner to a site designated by the Concerned Authority for this purpose, unless this Authority decides else Article 4 is followed.

Article 6: In areas where collection systems have been established the Concerned Authority shall provide the necessary number of waste containers and points shall be allocated for the collection of this waste. It is not permitted for any person to dispose of solid non-hazardous waste in places other than these places.

Article 11: The Concerned Authority shall ensure that treatment and disposal of solid non-hazardous waste within its area of responsibility are carried out without creating any health or environmental hazard.

Article 13: No solid non-hazardous waste should be mixed with any category of hazardous waste at any time.

1.3.4.2 MANAGEMENT OF HAZARDOUS WASTE (MD 18/1993)

Article 1 of MD 18/1993 states that Hazardous Waste is classified as any waste arising from commercial, industrial, agricultural, or any other activities which (due to its nature, composition, quantity or any other reason) is hazardous or potentially hazardous to human health, plants or animals, air, soil or water. This includes explosive, radio-active or flammable substances; which may cause disease as well as those issued by a decision from the Minister. The Ministerial Decree also contains the following articles that may be pertinent to the Project:

Article 4: No hazardous waste shall be mixed with any other category of waste nor shall it be discharged to a common or other internal or external sewerage or other drainage system without a licence from the Ministry.

Article 5: Every hazardous waste generator shall complete a Consignment Note for each category of hazardous waste before the hazardous waste leaves his land or premises.

Article 6: All hazardous waste shall be labelled and packed according to the Ministerial Decision issued in this respect.

Article 8: Every hazardous waste generator shall store hazardous waste in approved storage facilities on his land or at his premises until its removal in accordance with the terms of the licence issued by the Ministry.

Article 9: Hazardous waste shall be transported by transporters licensed by the Ministry to collect, handle, store and dispose hazardous waste outside the waste generator's premises. This licence will be issued with conditions after the approval of Royal Oman Police.

Article 10: Every owner of any site where hazardous waste is to be stored, shall apply for a licence from the Ministry and shall operate the site only in accordance with the terms of the issued licence which shall include a requirement that all hazardous waste received at the site shall be accompanied by appropriate Consignment Note(s) in accordance with Article (5).

1.3.4.3 CHEMICAL MANAGEMENT

The organization of handing and use of chemicals law (MD 25/2009) defines a "Chemical' is any substance, enlisted, as hazardous material according to the International Classification of Hazardous Material, which affects the public health or the environment. The following articles under MD 25/2009 have relevance:

Article 2: The user of the chemical substance, in the event of storage, shall comply with the following conditions:

- Store chemicals in designated areas away from industrial activities, each type to be separated, and a partition of 10 m width shall be made between the flammable materials and any source of combustion, and they shall be separated from any facility for the production of flammable materials by 3 m.
- They shall be stored in an orderly and harmonized manner with labelling of each chemical showing its common name, chemical composition and degree of risk, with chemical containers not to be placed on each other in an accumulated manner, and flammable materials to be kept away for a distance of not less than one meter from the warehouse doors.
- The roofs of the store shall be designed in such a manner that prevents accumulation of smoke which may result from any fire.
- The store shall have at least two emergency gates for use in emergency cases with emergency signs affixed to the gates.
- The floor of the store shall be lined with impermeable materials, preventing any shock or electrical short, non-slippery and its walls and structures shall be non-flammable.
- The store shall have outlets and back-up emergency ducts in case of leakage of rain water.

- Electrical connections shall not be bare, shall be connected in parallel and maintained to permanently ensure their safety.
- The store shall be provided with adequate and secure lighting at all times and the operating keys shall be outside the store near its gate.
- The store shall be far from any source of heat or any flammable source.
- It shall contain odours, gases and smoke suction and exhaust devices.
- The store shall be well ventilated with sound insulation to prevent any echo, which may lead to fall or collision accidents.
- The store shall be provided with security and safety devices to be decided by the competent authorities.
- The store shall contain guidelines and warning signs of various types of risks.
- The store entrances shall be controlled, monitored and supervised in a safe and sound manner with prohibition of entry to non-authorized staff.
- Review the Material Safety Data Sheets when a chemical substance spills, leaks, or any other emergency incidents.
- No construction, extension or change in the store or any removal works unless after the approval of the Ministry and The Directorate General of Civil Defence, Royal Oman Police.

1.3.4.4 WASTEWATER RE-USE AND DISCHARGE (MD 145/93)

The re-use and discharge of wastewater to the terrestrial environment is regulated by the Wastewater Re-Use and Discharge law (MD 145/93). Applicable wastewater re-use and discharge standards are presented in Table 1.6 and are Oman's common standard. These standards are also referred to as RD 115/2001 (Law on Protection of Sources of Potable Water from Pollution).

TABLE 1.6 WASTEWATER DISCHARGE AND RE-USE STANDARDS - PART A, CATEGORIES

Specification	Standard A	Standard B
Crops	Vegetables likely to be eaten raw. Fruit likely to be eaten raw and within 2 weeks of any irrigation.	Vegetables to be cooked or processed. Fruit if no irrigation within 2 weeks of cropping. Fodder, cereal and seed crops.
Grass and ornamental areas	Public parks, hotel lawns, recreational areas. Areas with public access. Lakes with public contact (except places which may be used for praying and hand washing).	Pastures. Areas with no public access.

The maximum permissible concentrations of various pollutants in the treated wastewater are as specified Table 1.7.

TABLE 1.7 WASTEWATER DISCHARGE AND RE-USE STANDARDS - PART B, SPECIFICATIONS

Parameter mg/L except where otherwise stated	Standards[1]	
	A	B
Biochemical Oxygen Demand (BOD) (5d@20°C)	15	20
Chemical Oxygen Demand (COD)	150	200
Suspended Solids (SS)	15	30
Total Dissolved Solids (TDS)	1,500	2,000
Electrical Conductivity (EC) (µS/cm)	2,000	2,700
Sodium Absorption Ratio (SAR) *(The effect of Sodium on soil absorption)*	10	10
pH (within range)	6-9	6-9
Aluminium (as Al)	5	5
Arsenic (as As)	0.100	0.100
Barium (as Ba)	1	2
Beryllium (as Be)	0.100	0.300
Boron (as B)	0.500	1
Cadmium (as Cd)	0.010	0.010
Chloride (as Cl)	650	650
Chromium (total as Cr)	0.050	0.050
Cobalt (as Co)	0.050	0.050
Copper (as Cu)	0.500	1
Cyanide (total as CN)	0.050	0.100
Fluoride (as F)	1	2
Iron (total as Fe)	1	5
Lead (as Pb)	0.100	0.200
Lithium (as Li)	0.070	0.070
Magnesium (as Mg)	150	150
Manganese (as Mn)	0.100	0.500
Mercury (as Hg)	0.001	0.001
Molybdenum (as Mo)	0.010	0.050
Nickel (as Ni)	0.100	0.100

Parameter mg/L except where otherwise stated	Standards[1]	
	A	B
Nitrogen: Ammoniacal (as N)	5	10
: Nitrate (as NO_3)	50	50
: Organic (Kjeldahl) (as N)	5	10
Oil and Grease (total extractable)	0.500	0.500
Phenols (total)	0.001	0.002
Phosphorus (total as P)	30	30
Selenium (as Se)	0.020	0.020
Silver (as Ag)	0.010	0.010
Sodium (as Na)	200	300
Sulphate (as SO_4)	400	400
Sulphide (total as S)	0.100	0.100
Vanadium (as V)	0.100	0.100
Zinc (as Zn)	5	5
Faecal Coliform Bacteria (per 100 mL)	200	1,000
Viable Nematode Ova (per litre)	<1	<1

[1] *Standards relate to the different acceptable areas of application for wastewater re-use.*

While primarily applicable for the application of sludge to agricultural land, as per MD 17/93, any sludge to be disposed of as a non-hazardous waste must comply with the concentrations presented in Table 1.8.

TABLE 1.8 CONDITION OF SLUDGE FOR APPLICATION TO LAND

Metal	Maximum concentration (mg/kg of dry solids)	Maximum Application rate (kg/ha) *	Maximum permitted concentration in soil (mg/kg of dry solids)
Cadmium	20	0.150	3
Chromium	1,000	10	400
Copper	1,000	10	150
Lead	1,000	15	150
Mercury	10	0.100	1
Molybdenum	20	0.100	3
Nickel	300	3	75
Selenium	50	0.150	5

Metal	Maximum concentration (mg/kg of dry solids)	Maximum Application rate (kg/ha) *	Maximum permitted concentration in soil (mg/kg of dry solids)
Zinc	3,000	15	300

* Based on a ten-year average and a soil pH > 7.0

After the spreading of sludge, there must be a minimum period of three weeks before grazing or harvesting of forage crops. Sludge use is prohibited:

- On soils whilst fruits or vegetable crops (other than fruit trees) are growing or being harvested;
- For six months preceding the harvesting of fruit or vegetables, which grow in contact with the soil and which are normally eaten raw; and
- On soils with a PH < 7.0.

1.4 GLARE ON AIRPORTS

According to Civil Aviation Regulation (CAR-139) on aerodrome certification, design and operation, lights which may cause confusion to airport operations shall not be permitted in an aerodrome that in the opinion of Civil Aviation Authority (CAA) may cause glare/dazzle to airport users. Particularly for the Project, the Project Proponent has obtained a No Objection Certificate (NOC) from the CAA, in which the Project commits to use anti-reflection panels. No further technical studies are required based on the NOC conditions.

1.5 SOCIAL

1.5.1 PERSONAL DATA PROTECTION LAW

The promulgation of the personal data protection law (RD 6/2022) issued February 2022 in Official Gazette No 1429 explicitly outlines the protection of personal data under the provisions of this law.

The provisions of this law shall apply to the processing of personal data which has been defined as *Data that identifies or can identify a natural person directly or indirectly, based on one or more identifiers, such as name, national ID number, electronic identifiers, location data, or one or more factors specific to the genetic, physical, mental, psychological, social, cultural, or economic identity.*

Article in the Royal Decree that is applicable to the Project:

Article 5: The processing of personal data related to genetic data, biometric data, health data, racial or ethnic origin, sexual life, political opinions, religious or philosophical beliefs, criminal convictions, or data concerning security measures is prohibited unless authorized by the ministry in accordance with the regulations and procedures specified by the law.

Rights of the Data Subject:

1. Personal data must not be processed without explicit consent from the data subject.
2. The data subject has the right to withdraw their consent, request modification or blocking of their data, obtain a copy of their data, transfer their data to another controller, request

erasure of their data (unless required for national preservation), and be notified of any data breaches.

3. The regulation will specify controls and procedures for exercising these rights.
4. Data subjects can file complaints with the Ministry if they believe their data processing violates the law.

The provisions of this law do not apply to the processing of personal data in certain circumstances, including cases related to national security, public interest protection, execution of tasks by governmental entities, legal obligations, protection of state interests, vital interests of the data subject, criminal offence detection or prevention, contract execution, personal or family contexts, authorized research purposes, and publicly available data not contradicting the law.

1.5.2 LABOUR LAW

The Omani Labour Law (RD 53/2023) issued in July 2023 outlines minimum standards and conditions of employment, and compliance with the set Omanisation quotas and plans.

According to Article 18, employment is a right for Omanis, and non-Omani workers may only be employed under specific conditions. The project must therefore ensure that Omanis are employed in various roles, maintaining detailed records of their professions, salaries, and other relevant information in a specialised register. This register must be updated annually and submitted to the Ministry, including data on job vacancies and the annual Omanisation plan (Article 19).

Moreover, Article 20, which mandates that a ministerial regulation be issued to guide the training of Omani workers, with the company required to contribute to training programs and coordinate with the Chamber of Commerce and Industry. For companies employing 25 or more workers, Article 22 outlines additional responsibilities, such as advertising job vacancies, adhering to professional classifications, and providing training and appropriate working conditions for Omanis. Additionally, Article 24 emphasizes the inclusion of qualified individuals with disabilities, ensuring that they are employed in roles suited to their capabilities.

Compliance with these regulations maximizes the project's contribution to ICV by enhancing local employment, developing skills, promoting fair practices, and supporting inclusivity.

1.5.3 CULTURAL HERITAGE LAW

The laws and regulations in Oman that are especially pertinent to the Project include those outlined in Table 1.9:

TABLE 1.9 LEGAL INSTRUMENTS FOR CULTURAL HERITAGE IN OMAN

Legal Instruments for Cultural Heritage in Oman
Royal Decree 35/2019 on the Cultural Heritage Law, 2019
Royal Decree to adopt the Cultural Diversity Convention, 2007
Royal Decree to adopt of the UNESCO Convention of Safeguarding of the Intangible Heritage (2005)

Legal Instruments for Cultural Heritage in Oman

Royal Decree 24/2005 on the functions and structure of the Ministry of Heritage and Culture (2005);

1.5.3.1 ROYAL DECREE 35/2019 ON THE CULTURAL HERITAGE LAW, 2019

Royal Decree 35/2019 on the Cultural Heritage Law (CHL), 2019 was issued as a replacement for the National Heritage Protection Law (NHPL) that was in force since 1980. The CHL defines cultural heritage as 'everything of cultural heritage significance, tangible or intangible, including monuments, historical cities, traditional villages, old harat [historic building groups], literature, and languages' (Article 1 Part g). Although it does not define cultural heritage, it exemplifies its two types; tangible and intangible. CHL applies to both the Omani and non-Omani cultural heritage present on the territory of the Sultanate.

State Regulator – Ministry of Heritage and Tourism

In 1977 the Ministry of National Heritage and Culture was created as the state regulator for heritage, changing its name to the Ministry of Heritage and Tourism in 2020. The Ministry is tasked to protect tangible as well as intangible property — such as traditional professions, scientific and intellectual achievements — and to safeguard national traditions. The ministry issues licenses which are legally required for archaeological excavations. All excavated movable cultural property must be reported to administrative authorities and is considered to be State property. The Ministry also maintains a listing (inventory) of all movable cultural heritage.

APPENDIX D CLIMATE CHANGE RISK ASSESSMENT (CCRA)

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0. EXECUTIVE SUMMARY

ERM has been commissioned to undertake a Climate Change Risk Assessment (CCRA), as a part of a larger Environmental and Social Impact Assessment (ESIA) – in support of the proposed development of a photovoltaic plant in Oman (hereafter referred to as "The Project").

Aligned with Project international standards and in accordance with EP4's 2023 Guidance Note, this CCRA is made up of three distinct phases of analysis, the first of which is included within this report. This first phase of analysis includes an assessment of the current and future projected inherent physical climate-related risks which could be material in relation to the construction and operational phases of the Project. This assessment utilises projected climate data across three timeframes: baseline (present day), 2030 and 2050 under low (SSP1-2.6) and high (SSP5-8.5) emission scenarios.

Based upon the climate data analysed within this report, a number of key hazards have been identified as posing the most material (inherent) risks in relation to the Project, including:

- Extreme heat;
- Extreme rain flooding (likely to impact some locations within the vicinity of the photovoltaic plant as well as its substation);
- Extreme winds and storms (including cyclones); and
- Water stress.

Following the identification of relevant hazards, a longlist of key associated risks has been generated – which are anticipated to have the potential to be material to construction and/or operational phase of the Project. Below is a summary of the most material risks (e.g. those rates as 'Likely Material – Moderate to High') which were identified as a part of this assessment, including the identification of:

- The aspect of the Project each risk is associated with (referred to as 'risk areas'); and
- A summary of ERM's recommended next steps for each risk.

Climate Hazard	Hazard Category	Risk Area	Potential Impact	Implications	Recommended Risk Mitigation Measures
Extreme Heat	Acute / Chronic	Associate and Supporting Facilities	Physical damage to assets	• Extreme heat is expected to pose a high risk to solar power plants, including reduced efficiency, decreased power output, component degradation, increased maintenance costs, and operational risks. • Higher temperatures can reduce the efficiency of photovoltaic cells, thus reducing electrical output. This reduction can impact the ability of the solar power plant to meet electricity demand, which may result in decreased revenue for plant operators. • Extreme heat can cause operational risks for solar power plants, i.e., overheating of electrical components, increased risk of fires, and health and safety risks to site personnel working outdoors. • Extreme heat can cause the expansion/contraction of materials, leading to potential damage to solar panels. As a result, photovoltaic cells degrade more rapidly, which reduces their lifespan and overall durability. • High temperatures can increase the resistance in transmission lines, leading to energy losses during transmission. • Can cause the expansion of conductors in transmission lines, which leads to sagging.	• Invest in solar panels made from materials designed to withstand higher temperatures without losing efficiency. • Ensure sufficient airflow beneath panels for cooling. For example, mounting panels slightly above the surface can create a small air gap that helps dissipate heat. • Upgrading transmission infrastructure to withstand extreme weather events, such as using stronger materials to reduce vulnerability. • Implement Dynamic Line Rating (DLR) systems that optimize the use of transmission lines by adjusting power flow based on real-time conditions, such as temperature and wind speed.

Climate Hazard	Hazard Category	Risk Area	Potential Impact	Implications	Recommended Risk Mitigation Measures
				• During extreme heat events, there may be an increased energy demand for cooling indoor areas for equipment and personnel, which can increase costs.	
		Site Personnel	Impact on workers	• Prolonged exposure to high temperatures can lead to fatigue, heat stress, heat stroke, dehydration, etc., thus affecting the overall health of employees working at the site. • Cause reduction in the physical work capacity/efficiency, leading to lower productivity levels.	• Develop comprehensive heat emergency response plans outlining protocols for addressing heat-related emergencies and providing medical assistance if needed. • Ensure a heat stress management plan covers outdoor workers and employees. • Implement mandatory rest breaks in shaded or air-conditioned areas to allow workers to cool down. • Provide water and electrolyte drinks at regular intervals to prevent dehydration. • Rotate worker's shifts frequently to limit their exposure to extreme heat. • Conduct heat awareness training programs to educate employees about heat-related risks and the importance of staying hydrated.

Climate Hazard	Hazard Category	Risk Area	Potential Impact	Implications	Recommended Risk Mitigation Measures

Flooding	Acute	Associate and Supporting Facilities	Physical damage to assets	• Flooding can significantly impact solar power plants, affecting their performance, durability, and financial viability.
				• Floodwater can damage electrical components such as inverters, transformers, and control systems. Water ingress can cause short circuits and corrosion, leading to malfunctions or complete failure.
				• Prolonged submersion can physically damage solar panels, as floodwater can carry debris that may scratch or shatter them.
				• Flood waters can challenge the structural integrity of solar panels, especially the ground-mounted systems, causing misalignment or collapse.
				• Flooding can hinder repair/maintenance efforts, leading to prolonged downtime and increased costs for restoring normal operations.
				• Flooding can reduce power generation by reducing the ability of solar panels to capture sunlight efficiently. Further, damage to electrical systems can halt power production.
				• Floodwaters can carry contaminants that may corrode metal parts. If solar panels or batteries are damaged, hazardous materials could be released into the environment.
					• Where feasible, relocate infrastructure at risk of flooding to areas with lower flood risk. This option is the most advisable, as it reduces the cost of implementing flood protection measures.
					• Recommended flood protection measures:
					  ○ Installing electrical components and critical infrastructure above potential flood levels to prevent water damage.
					  ○ Backfilling depressions to the natural ground level to avoid water accumulation.
					  ○ Constructing barriers or levees around the plant to prevent floodwaters from reaching critical areas.
					  ○ Effective drainage systems can help divert floodwaters from the plant, reducing the risk of damage.
					  ○ Implement low-water crossings (Irish type) to prevent site road crossings from flooding.

Climate Hazard	Hazard Category	Risk Area	Potential Impact	Implications	Recommended Risk Mitigation Measures
				• The cost of repairing/replacing damaged equipment, including the labor and material costs associated with restoration, can be substantial. • Reduced/halted power generation results in revenue loss. • Repeated or severe flooding can lead to increased insurance premiums or difficulty obtaining coverage. Insurers may impose higher costs due to the perceived increased risk. • It can cause physical damage to transmission infrastructure, substations, and underground cables.	○ Elevating substations and critical components above-expected flood levels. ○ Installing pumps in low-lying areas to quickly remove accumulated water. • Conduct routine inspections and maintenance to identify vulnerabilities and ensure that protective measures are functioning properly. • Obtain comprehensive insurance coverage that also includes flood damage to mitigate financial risks.
		Site Personnel	Impact on workers	• Floodwaters can lead to short circuits and other electrical hazards. • Floodwaters can make it difficult for workers to access the site, disrupting maintenance and operational activities. • Floodwaters can spread contaminants, thus affecting the local environment and worker's health.	• Develop emergency response plans, outlining specific actions to be taken during flood events. • Train staff on emergency procedures and conduct regular drills to ensure readiness. • Implement effective drainage systems to redirect water from the Site.
Water Stress	Chronic	Associate and Supporting Facilities	Physical damage to assets	• Water scarcity may not directly impact the physical infrastructure but can affect the operations of Solar Power plants.	• If water is needed for operations, consider using non-potable sources like treated wastewater or greywater to

Climate Hazard	Hazard Category	Risk Area	Potential Impact	Implications	Recommended Risk Mitigation Measures
				• Solar panels require regular cleaning to maintain optimal performance. In regions with water scarcity, access to enough water for cleaning can be limited or expensive, leading to a decrease in operational efficiency and energy output due to the build-up of dirt and dust obstructing sunlight from reaching the photovoltaic cells. • The cost of water may also go up. The exposure could be rated low depending on how the panels are cleaned, e.g., AI robots use comparatively less water than manual cleaning. • Water scarcity may also trigger regulatory considerations for the developers/operators of solar power plants. Government authorities may impose restrictions on water usage and necessitate the implementation of water-saving technologies.	reduce the demand for local freshwater supplies. • Deploy robotic cleaning systems that can operate with minimal water or use no water at all. • Identify alternate water sources to ensure uninterrupted water supply during periods of water stress. • Explore opportunities for rainwater harvesting at the site and within a wider watershed area. • Comply with local and national water use regulations to avoid legal issues and ensure sustainable water practices. • Develop and implement water conservation policies and practices within the solar power plant operations. • Implement systems to regularly monitor water usage to identify leaks, wastage, or inefficiencies.
		Site Personnel	Impact on workers	• There may be a health and safety risk for site personnel if there is not adequate drinking water supply. • Water stress can exacerbate the risk of heat-related illnesses such as heat exhaustion and heat stroke in hot climates.	• Implement systems to recycle/reuse water for cleaning and cooling purposes. • Ensure workers have an ample supply of drinking water and encourage regular hydration breaks.

Climate Hazard	Hazard Category	Risk Area	Potential Impact	Implications	Recommended Risk Mitigation Measures
				• Insufficient water for sanitation can lead to poor hygiene, thus increasing the risk of infections and illnesses.	• Implement programs to educate workers and local communities on water conservation practices and the importance of sustainable water management.
Cyclones (Extreme winds and storms)	Acute	Associate and Supporting Facilities	Physical damage to assets	• Cyclones can pose significant challenges to solar power plant operations and maintenance. Hence, proactive measures are necessary to improve resilience, reduce risks, and ensure the long-term sustainability of solar energy infrastructure in cyclone-prone regions. • Strong winds allied with cyclones can cause extensive damage to solar panels (i.e., wrecked glasses and bent frames) that will affect the integrity and functionality of the panels. • Can interrupt the normal operations of solar power plants by causing power outages, damage to electrical components, and disruptions in grid connectivity, leading to decreased energy production and revenue loss. • Can cause structural damage to mounting systems, support structures, and other components. • Cyclones and high winds can cause direct physical damage to transmission lines, i.e., breaking of cables and damaging substations.	• Mounting structures and support systems of solar panels should be designed to withstand high wind and debris impact, i.e., using materials and engineering standards that adhere to local building codes and regulations. • Develop and implement cyclone-specific emergency preparedness and response plans and establish protocols for securing equipment, evacuating personnel, and shutting down operations safely in advance. • Installing power backups, i.e., battery storage and/or diesel generators, to maintain key operations during the time of power outages caused by cyclones. • Stay informed about evolving weather conditions and take proactive measures regarding the potential impacts of

Climate Hazard	Hazard Category	Risk Area	Potential Impact	Implications	Recommended Risk Mitigation Measures
				• Flying debris can strike transmission lines, causing breaks or damaging insulation. • The operators may incur substantial costs associated with repairing/replacing of damaged equipment to restore operations to normalcy. • Cyclones can cause prolonged downtime of solar power plants, leading to a loss in productivity and revenue generation during the period. • Insurance premiums may increase in cyclone-prone regions due to the higher risk associated with operating solar installations.	Cyclones on solar power plant operations. • Obtain appropriate insurance for cyclone-related risks and losses and work closely with insurers to understand policy terms and conditions, coverage limits, and claim procedures.
		Site Personnel	Impact on workers	• High winds and flying debris can cause physical injuries to workers. • Flooded or blocked roads can prevent workers from reaching the site or evacuating if necessary. • Floodwaters can carry contaminants, potentially impacting both the environment and worker health.	• Provide training to staff members on cyclone safety, emergency procedures, and first aid. • Ensure that there are robust, cyclone-resistant shelters on-site where workers can take shelter during a storm. • Use cyclone-resistant designs for buildings and critical infrastructure to withstand high winds and flooding. • Run awareness programs to inform workers about the risks of cyclones and the importance of following safety protocols.

It is recommended that all risks (including the additional lower materiality risks) identified within this report are reviewed in further detail within follow-on phases of assessment with particular consideration being given to the most material risks – as listed in the table above).

1. INTRODUCTION

This Appendix presents a Climate Change Risk Assessment (CCRA) which comprises a comprehensive climate affairs study essential for the Environmental and Social Impact Assessment (ESIA) of the photovoltaic project in Oman.

In the pursuit of a sustainable and responsible approach to Project development, a CCRA has been undertaken in alignment with the Equator Principles 4 (EP4) Guidance Note for CCRA's (initially EP4 published its CCRA guidance in September 2020, which has since been superseded with updated guidance being published in May 2023).

It should be noted that an EIA was developed by 5OES in June 2024 and already included relevant sections on Climate Change that were compliant with Omani Regulations for the Management of Climate Affairs ('Guidelines for the Preparation of Climate Affairs Chapter in the Environmental Impact Assessment (EIA) Study for the projects'). The EIA was approved by EA in July 2024 and a number of permit conditions were related to GHG emissions monitoring and climate change. These permit conditions have been considered in the main ESIA (see Chapters 7 and 8).

The CCRA seeks to equip stakeholders with a thorough understanding of the climate-related considerations associated with the Project. By integrating these assessments into the broader ESIA, the Project is committed to promoting a responsible development that aligns with global sustainability objectives and fosters resilience in the face of a changing climate.

2. OVERVIEW OF THE PHYSICAL CLIMATE CHANGE RISK ASSESSMENT

According to the Task Force on Climate-related Financial Disclosures (TCFD), Physical Climate risks are defined as risks arising from the physical effects of climate change, which can be event-driven (acute) or associated with longer-term shifts in climate patterns (chronic). It may have financial implications for organizations, such as direct damage to assets and indirect impacts from supply chain disruption.

Aligned with Project international standards and in accordance with EP4's 2023 Guidance Note, a materiality-based approach in line with the recommendations of the TCFD was used to evaluate the potential physical impacts of climate change. The main objectives are to:

- Identify physical hazards to which the Site is exposed during the Baseline as well as in future time horizons under the considered scenarios and
- Understand the likely implications of these climate natural hazards on the Project in forward-looking climate scenarios.

The proposed study aims to provide a high-level evaluation of physical risks that may be relevant to photovoltaic facilities in northern Oman. ERM will assess the impact of climate change mainly on the following hazards/variables as illustrated in Figure 2.1.

FIGURE 2.1 NATURAL HAZARDS

This physical climate change risks assessment (CCRA) study is a desk-based study comprising a literature review and analysis of readily available open and paid data sources. To generate climate indicators, ERM uses the latest multi-ensemble suite of climate models from the Coupled Model Intercomparison Project, Phase 6 (CMIP6) database, which is compatible with the Intergovernmental Panel for Climate Change Sixth Assessment Report (IPCC-AR6). Accordingly, ERM uses the latest Shared Socioeconomic Pathways (SSPs) emission scenarios for future projections.

From the CMIP6 suite of climate scenarios, ERM proposes using the following two scenarios to cover a full range of potential paths and projections.

- **SSP1-2.6:** Sustainable Path - Reaching net-zero after 2050, global mean temperatures stabilizing around 1.8 °C by 2100.
- **SSP5-8.5:** Worst Case - CO2 emissions double by 2050 with the mean global temperature reaching higher than 4.4 °C by 2100.

3. SCOPE

According to Equatorial Principles (EP4), a CCRA should include consideration of relevant climate-related 'Physical Risks' as defined by the Task Force on Climate-Related Financial Disclosure (TCFD). In addition, if, when combined Scope 1 and Scope 2 emissions exceed 100,000 tonnes of CO2 equivalent annually, all projects, in all locations, must include the consideration of climate-related 'Transition Risks' (as defined by the TCFD) in a CCRA. Similarly, if this threshold is exceeded a greenhouse gas (GHG) alternatives analysis (AA) is also required (according to EP4 CCRA guidance).

Based on the nature and scale of this renewable energy project, annual estimate of greenhouse gas (GHG) emissions (Scope 1+2) over the lifetime of the Project is expected to be less than the EP4 threshold value of significance of 100,000 tonnes of carbon dioxide equivalent (tCO2e) per year; therefore, a transition CCRA and a GHG alternatives analysis is not considered necessary, according to Project international standards. Likewise, since the energy generated by the Project will avoid emissions that would otherwise be generated wholly or partly from more carbon-intensive higher GHG emitting sources and since it is a renewable energy generation project, whose operation phase emissions are considered to displace

emissions that will otherwise be sourced from other electricity generation technologies, no transitional CCRA is considered necessary. The Project is, in fact, considered to have a positive impact on climate change.

TRIGGERS FOR AN EP4 ALIGNED CCRA

Due to the nature of the construction and operations associated with the Project, it is assumed the proposed Project classification is 'Category B' (according to International Finance Corporation definitions). EP4 guidance requires all Category A, and as appropriate, Category B projects to undertake a physical CCRA.

This report includes the physical risk CCRA, that is made up of three distinct phases of analysis, the first of which is included within this report. Phase 1 includes an assessment of the current and future projected inherent physical climate-related risks ('inherent' refers to risks posed to the Project in the absence of further management/ mitigation measures) which could be material in relation to the construction and operational phases of the Project. Once risks have been quantified, the Client will have the opportunity to implement further management/mitigation measures into the Project's design to manage material risks. Following this, to fully align with EP4's 2023 Guidance Note, during later stages of the Project, the Client will be required to financially quantify the risks which have been identified in Phase 1 as potentially material to the Project (Phase 2) and; how these risks are being managed/mitigated within a Climate Change Risk Management Plan (CCRMP) (Phase 3).

The MD 20/2016 and MECA (now EA) Guideline: Form 1 (2017) requires that a project's aspects and impacts related to climate change be assessed as part of an EIA. This has been covered in the EIA Rev A, which obtained EA approval on July 2024 and a number of permit conditions were related to GHG emissions monitoring and climate change. These permit conditions have been considered in the main ESIA (see Chapters 7 and 8)..

PROJECT COMPONENTS AND ASSOCIATED FACILITIES

It is understood that a number of facilities and specific pieces of infrastructure will be constructed (or in the case of the accommodation camps are already in place but will be included) as a part of the Project. Most notably this includes the:

- **Photovoltaic plant**: consisting of a series of components including: PV Modules, Inverters and Mounting system
- **Internal roads (incl. peripheral roads)**
- **On-site electrical connections and step-up substation**
- **Temporary construction compound**
- **Meteorological stations**
- **Perimeter fence**

Similarly, there are also a number of Associated Facilities (AFs) which will be built in support of the Project (referring to any aspects of infrastructure that would not have been constructed or expanded if the Project did not exist, and without which the Project would not be viable). This includes the:

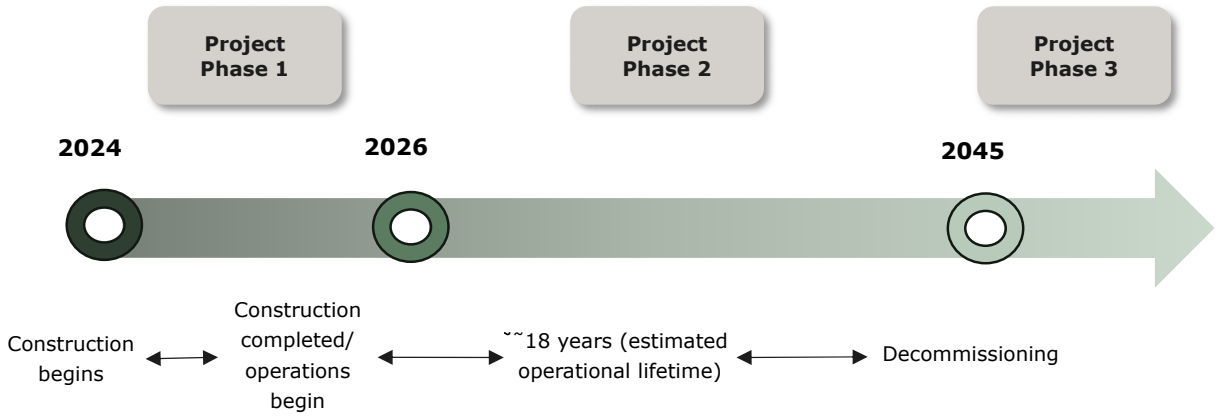
- **External site access road**
- **Interface yard and overhead Transmission line (OHTL):** of approximately about 5 km long from the Project's step-up substation to PDO's SNDC substation.

Each of these key Project facilities and AFs will be considered within this assessment – to ensure a full and representative analysis of the different climate-related risks posed to the Project is undertaken.

PROJECT TIMELINE

It is anticipated that the construction/commissioning phase of the Project will last between 18 months in total, estimated to start in Q4 2024. The final length of the program will be dependent on seasonal working and weather conditions. Finally, the Project's operation lifetime with the Project Proponent will be of 18 years after which, the Project will be handed over to PDO in year 19, as part of the Project agreements, and it is expected to continue operating for a period thereafter.

FIGURE 3.1 TIMELINE OF THE NORTH OMAN SOLAR PV PROJECT

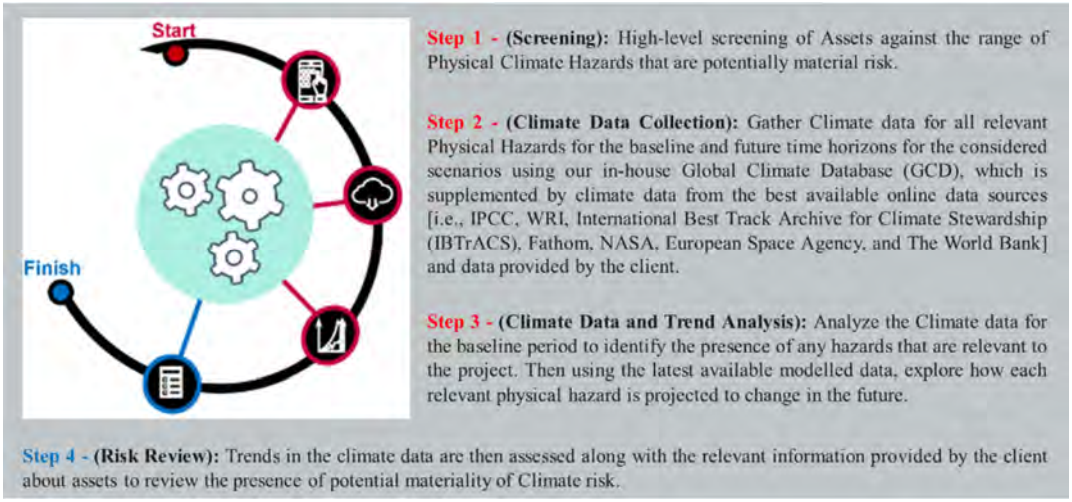


4. PHYSICAL RISK ASSESSMENT METHODOLOGY

ERM's Climate Impact Platform (CIP) provides a framework and leading data to conduct physical risk assessments across different sectors and geographies. This physical CCRA is conducted through four key steps as outlined in Figure 4.1 below.

- Steps 1-3 (in red) involve the high-level screening of the Project through the collection and analysis of climate data and climate trends.
- Step 4 (in blue) constitutes the review of hazards that are identified as posing potential material risks to the Project.

FIGURE 4.1 A SUMMARY OF THE FOUR KEY STEPS OF PHYSICAL CCRA



4.1 STEP 1-SCREENING

For the physical CCRA, the high-level screening of the following hazards has been conducted (see Table 4.1).

TABLE 4.1 CLIMATE NATURAL HAZARDS ASSESSED FOR THE PHYSICAL RISKS

S. No.	Climate Hazard	Risk Category	Indicator	Description
1.	Extreme Heat	Acute / Chronic	Warm Spell Duration Index (days)	The annual number of days contributing to unusually warm events where 6 or more consecutive days experience a maximum temperature of greater than the 90th percentile of the historical averages for that time of year.
2.	Extreme Cold	Acute	Cold Spell Duration Index (days)	The annual number of days contributing to unusually cold events where 6 or more consecutive days experience a minimum temperature of less than the 10th percentile of the historical averages for that time of year.
3.	Riverine Flooding	Acute	1-in-500- year River Flooding Inundation Depth (meters)	The maximum inundation depth experienced within a 270mx270m area that is associated with a 1-in-500-year undefended river flooding event.
4.	Extreme Rain Flooding	Acute	1-in-500-year Rainfall Flooding Inundation	The maximum inundation depth experienced within a 270mx270m area that is associated with a 1-

S. No.	Climate Hazard	Risk Category	Indicator	Description
			Depth (meters)	in-500-year pluvial (extreme-rainfall-induced) flooding event.
5.	Coastal Flooding	Acute / Chronic	1-in-500- year Coastal Flooding Inundation Depth (meters)	The maximum inundation depth associated with a 1-in-500-year coastal flooding event as a result of projected sea level rise, land subsidence, storm surges, and/or high tide events.
6.	Cyclones	Acute	Maximum Tropical Cyclone Wind Speed (knots)	The maximum sustained wind speed associated with being within 200km of a tropical cyclone, based on cyclone basin-specific tropical cyclone projections generated using AR6 global mean surface temperature projections.
7.	Landslides	Acute	Rainfall-Induced Landslides Index (days)	The annual number of days with a potential chance of a rainfall-induced landslide event. This index is developed using the antecedent rainfall index (weighted summation of daily rainfall amounts) and landslide susceptibility (based on slope, faults, geology, forest loss, and road networks).
8.	Water Stress	Acute / Chronic	Water Stress (categorical)	Projected water stress estimates the future competition for water resources and is defined as the ratio of demand for water by human society divided by available water.
9.	Wildfires	Acute	Forest Fire Danger Index (days)	The annual number of days with fire-permitting climatic conditions. This index is based on the McArthur Forest Fire Danger Index (FFDI; widely used in Australia for several decades) and combines a record of dryness, based on rainfall and evaporation, with meteorological variables for wind speed, temperature, and humidity.

4.2 STEP 2-CLIMATE DATA COLLECTION

The Physical CCRA uses several data sources, including baseline and projection data. ERM uses baseline data to understand the current presence of each climate hazard within the Project's area. Projections data suggest the potential change (if any) in intensity and frequency of each

climate hazard within the Project area under specified future timeframes and climate scenarios.

ERM collects a series of data variables for each climate hazard. This climate data is collected primarily using ERM's CIP and Global Climate Database (GCD) and is supplemented by any climate data provided by the client as well as the best available online sources of data.

4.3 BASELINE AND PROJECTIONS DATA

The baseline and climate projections data used is compiled from numerous international scientific organizations, including the IPCC, World Resources Institute (WRI), International Best Track Archive for Climate Stewardship (IBTrACS), Fathom, National Aeronautics and Space Administration (NASA), European Space Agency, and World Bank.

The climate data used is comprised of various types of datasets including **Observational (baseline only), Modelled,** and **Reanalysis (baseline only)** data**.**

- **Observational data (baseline only)** is based upon observations recorded and collected at various weather stations located around the world;
- **Modelled data** aims to identify, quantify, and accurately represent complex physical processes within the climate and can be generated in several formats, depending on the physical process being modelled and the differing resolution of models (e.g., Global Climate Models or Regional Climate Models). Modelled climate data can be used to highlight trends in climatic processes under historical (past), present, and projected future climatic conditions[1]; and
- **Reanalysis data (baseline only)** describes the reanalysis of previously recorded climate data, either from observations or modelled records. This data source aims to correct any biases, errors, and aspects of physical climatic processes that were previously unidentified within older iterations of data. These corrections can be carried out via the back testing of data against newly observed climatic trends and / or modelled climate data[2].

4.4 CLIMATE SCENARIOS

The IPCC is the UN's leading body for assessing the science related to climate change. The IPCC provides periodic Assessment Reports (AR) reviewing the available literature on climate change and trends in climatic hazards. Each new AR comes with a new round of climate models and datasets developed by the IPCC and Coupled Model Intercomparison Project (CMIP). ERM utilizes the latest round of climate data from the IPCC AR6, published in 2021, which marks the most well-rounded set of published climate data.

Climate models are continually being updated by incorporating higher spatial resolution, new physical processes, and biogeochemical cycles, hence the data provided by CMIP6 shows an improvement compared to the ones provided by CMIP5. CMIP6 also sees a move away from RCPs to SSPs, which aim to bridge the gaps between the physical climate and social sciences and explore the potential future climate response to a broader range of GHGs, land uses, and air pollutants.

[1] NOAA (2021), Climate Models (2022). Retrieved from: https://www.climate.gov/maps-data/primer/climate-models

[2] ECMWF (2021), Climate Reanalysis (2022). Retrieved from: https://www.ecmwf.int/en/research/climate-reanalysis

Each of the SSPs set out by the IPCC represents scenarios that vary based on future projected GHG emissions and resultant warming over the next century. As GHGs increase, there is the potential that climatic conditions within any given area could also change (e.g., changes in temperature and/or precipitation regimes). However, the specific change experienced for any given area can vary, depending on the prescribed increase in GHG emissions associated with each SSP and time horizon.

The TCFD recommends scenario analysis as a critical tool to understand the strategic implications of climate-related risks and opportunities for an organization. Scenario analysis enables organizations to examine various hypothetical scenarios that explore a range of global warming levels (from pre-industrial temperatures) and the associated physical, transition, and liability risks that could potentially impact their operations and value chain. The insights gained from scenario analysis can strengthen a company's strategic decision-making, facilitate risk management, and leverage on opportunities arising from the transition to a low-carbon economy.

Disclosing information related to the company's climate change mitigation and adaptation measures for different climate scenarios can enhance transparency and accountability to enable investors and other stakeholders to make informed decisions about the company's exposure to climate-related risks and opportunities.

The TCFD technical guidance on climate scenario analysis recommends the inclusion of scenarios that encompass a range of reasonable outcomes, including:[3]

- **Low-carbon scenario:** A scenario representative of keeping global average temperatures at 2ºC or lower, most closely aligned with the Paris Agreement; and
- **High-carbon scenario:** A business-as-usual (BAU) scenario, where policy commitments do not develop to pursue decarbonization beyond those enacted today.

The climate scenarios for physical risk are chosen from the IPCC's SSPs[4] as outlined in Table 4.2.

TABLE 4.2 CLIMATE PROJECTION SCENARIOS

Scenario	Emission Scenarios	Estimated Temperature Rise (very likely) by 2100
Low Carbon	SSP1-2.6	1.3°C – 2.4°C
High Carbon	SSP5-8.5	3.3°C – 5.7°C

4.5 TIME HORIZONS

The time horizons considered in this report align with the TCFD recommendation of selecting:

- A short-to-medium term horizon; and
- A long-term time horizon

The short-to-medium horizon selected for physical risks is '2030'. The year 2030 holds great significance for sustainable development as it represents the year for achieving the targets of the United Nations 17 Sustainable Development Goals (UN SDGs). The UN SDGs were adopted

[3] TCFD (2017), Technical Supplement – The Use of Scenario Analysis in Disclosure of Climate-Related Risks and Opportunities. Retrieved from: FINAL-TCFD-Technical-Supplement-062917.pdf

[4] Carbon Brief (2018), Explainer: How 'Shared Socioeconomic Pathways' explore future climate change. Retrieved from: https://www.carbonbrief.org/explainer-how-shared-socioeconomic-pathways-explore-future-climate-change/

in 2015 by UN member states as a global framework to be attained within a 15-year timeline. Further, '2030' is often the short-term (or interim) target year in countries' Nationally Determined Contributions (NDCs).

Considering the expected operational lifetime of the Project is 25 years from baseline, an appropriate long-term horizon of physical risks will be '2050'. Hence, the CCRA considers the following periods outlined in Table 4.3.

TABLE 4.3 FUTURE TIME HORIZONS CONSIDERED FOR CCRA

Time Horizons	Physical Risk Review
Short-to-medium term	2030
Long-term	2050

4.6 STEP 3-CLIMATE DATA TREND ANALYSIS

Step 3 involves the analysis of baseline and future projected trends for each climate hazard including a review of the potential materiality of any risk present under the baseline conditions, and how this risk could potentially change in the future according to any key trends identified within the climate data. Each climate hazard is assessed concerning the Project using a mixture of climate data provided from the global climate database, extracted from ERM's CIP, and qualitative research that is sourced from industry-leading academic and governmental sources.

Any trends identified in the projected climate data are analyzed and interpreted to indicate the potential for a change in the presence and intensity of each climate hazard within the Project area, under two time horizons (i.e., 2030 and 2050) and for two climate scenarios (i.e., SSP1-2.6 and SSP5-8.5).

4.7 STEP 4-RISK REVIEW

ERM undertakes a review of the potential risks posed to the Project related to each climate hazard. Climate data is collected and discussed concerning three time periods (baseline, 2030, and 2050). 'Risk Materiality Categories' are only assigned to two of these periods, representing the start (baseline) and end of operations (2050). These two time periods have been selected to identify the potential change in the level of risk posed to the Project by the end of operations, in comparison to the baseline level of risk. Table 4.4 describes a detailed definition of risk material categories.

TABLE 4.4 RISK MATERIALITY CATEGORIES AND ASSOCIATED DEFINITIONS

Risk Materiality Category	Definition
Unlikely material	Impacts with this category (such as those related to operational, financial, or other types of impacts) are unlikely to be material. This means that, for example, (a) operational impacts could be expected to be short-term, impacting a limited proportion of the overall asset and its operations, or

Risk Materiality Category		Definition
		(b) financial impacts would be expected to be minimal relative to the project's overall revenue and/or costs.
Likely material	**Low to Moderate**	Impacts with this category (such as those related to operational, financial, or other types of impacts) are likely to be of low-moderate materiality. This means that, for example, (a) operational impacts could be expected to be short to medium-term, impacting a low to moderate proportion of the overall asset and its operations, or (b) financial impacts would be expected to be small to moderate relative to the project's overall revenue and/or costs.
	High	Impacts associated with this category (such as those related to operational, financial, or other types of impacts) are likely to be of high materiality. This means that, for example, (a) operational impacts could be expected to be medium to long term, impacting a low to moderate proportion of the overall asset and its operations, or (b) financial impacts would be expected to be moderate to high relative to the project's overall revenue and/or costs.

4.8 EXPOSURE RATINGS

Exposure ratings are assigned to each asset depending on its facility type (e.g., a Chemicals Manufacturing asset versus a Refineries & Processing asset). These ratings aim to incorporate an asset type's predisposed exposure to physical risk as shown in Table 4.5.

- Exposure ratings consider the significance of each climate hazard on an asset type of operations, supply chain, and market; and
- The full taxonomy of exposure ratings has been developed based on extensive qualitative research and supplemented by ERM's existing knowledge base of climate-related exposures.

TABLE 4.5 EXPOSURE RATINGS IMPACT TABLE

Exposure Rating	Multiplier	Potential Impacts are Likely to:
Very High	10	• Be long-term (possibly permanent), severe, and financially significant. • Have extensive social and health implications with national or international reputational impacts. • Affect large areas of the environment over a period of months, impacting high biodiversity areas. • It is likely that the entirety of the overall asset would be impacted.

Exposure Rating	Multiplier	Potential Impacts are Likely to:
High	8	• Be long-term (months) and financially significant to operations. • Have extensive social and health implications with national or international reputational impacts. • Affect large areas of the environment over a period of months impacting high biodiversity areas. • It is likely that a large proportion of the overall asset would be impacted.
Moderate	6	• Be medium-term (weeks) and moderately financially significant to operations. • Have minor/medium social and health implications with local reputational impacts. • Affect moderate areas of the environment over a period of weeks, impacting low biodiversity areas. • It is likely that a moderate proportion of the overall asset would be impacted.
Low	4	• Be short-term (days) and not financially significant to operations. • Have minimal social and health implications with limited reputational impacts. • Affect small areas of the environment over a short period. • It is likely that a small proportion of the overall asset would be impacted.
Minimal	2	• Exposure to Climate Hazards is minimal with limited potential effects to assets.
N/A	0	• Exposure to Climate Hazards is not relevant with no potential effects to assets.

4.9 RISK SCORES

A risk score is a quantitative number used to assess the current and projected impacts of physical hazards. This is based on climate data and an asset's exposure rating.

- A high-risk score indicates high exposure to a climate hazard, and/or a high relevance of that climate event type to a particular type of asset; and
- Risk scores can be calculated at each asset for hazard types (i.e., an 'Event Type Risk Score'), or these can be aggregated to obtain an average risk score for the asset (i.e., an 'Asset Risk Score').

Risk scores for individual hazard types are generated using the formula:

$$Risk\ Score_{hazard} = Normalised\ Climate\ Data\ x\ Exposure\ Rating\ Multiplier$$

Asset risk scores are the average of all hazard risk scores for an asset, which can be calculated using the formula:

$$Risk\ Score_{Asset} = \frac{\sum Risk\ Score_{hazard}}{n_{hazard}}$$

Where n_{hazard} is the number of climate hazards for an asset.

Absolute risk scores are calculated for present-day conditions and future projected conditions and can vary from a minimum of 0 to a maximum of 10. Absolute risk scores are categorized using the thresholds in Table 4.6 for the specific climate hazard or for the overall asset.

TABLE 4.6 CATEGORIES OF ABSOLUTE RISK SCORES

Risk Threshold	Event Type (Hazard) Risk Score Threshold	Asset Risk Score Threshold
Minimal	0 to 1	0 to 1
Low	1 to 2	1 to 2
Moderate	2 to 3	2 to 3
High	3 to 4	3 to 4
Very High	4 to 10	4 to 10

Table 4.7 outlines the thresholds used to identify the magnitude of increase or decrease in each risk score from baseline across future time horizons. For example, if a baseline hazard risk score is 2.0, and the 2050 hazard risk score is 3.5, then the hazard risk score has increased by 1.5 indicating a **Moderate Increase**. In all cases:

- **Orange** and **red** indicate a minimal and moderate **increase** in the future risk score, with darker red indicating a significant increase.
- **Blue** indicates a **decrease** in the future risk score, with darker blue indicating a larger decrease.

TABLE 4.7 THRESHOLD MAGNITUDE OF RISK SCORES

Risk Score	Change in Score
Significant Decrease	- 2 or below
Moderate Decrease	- 1 to – 2
Minimal Decrease	- 0.25 to – 1
No Change	- 0.25 to + 0.25
Minimal Increase	+ 0.25 to 1

Moderate Increase	+ 1 to + 2
Significant Increase	+2 or above

5. LIMITATIONS

We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such third party should rely on the report at their own risk.

The physical risk review is a preliminary screening exercise that evaluates the potential physical risks associated with climate-related natural hazards. The evaluation of the likely changes in natural hazards is based on the application of scientific principles, professional judgment, and the possible relationship between natural hazards and climate parameters.

To conduct the physical risk review, the Intergovernmental Panel of Climate Change Sixth Assessment Report (IPCC AR6) was used as a reference.[5]

There are several limitations and assumptions that accompany the report's sources and methodology and should be recognized when interpreting the results of this review. These include:

- This study is largely a desk-based review, and is not based on any on-site visits; therefore, reviews of the exposure of each asset are based upon information provided by the Client by June 2024. Any changes or updates to project information made after the reporting date is not considered in the review;
- ERM did not independently verify the information provided in the documents by the Client or obtained through third-party sources. The precision and comprehensiveness of our conclusions are reliant on the accuracy and completeness of the information presented to us and of the credible third-party source materials we referred to;
- The physical risk review in this report is subjected to the assumptions and methodologies of the modelling work performed by the IPCC in AR6;
- This review uses future projected outputs from Global Climate Models (GCMs). This means that GCM data has not been regionally downscaled and validated for the region where the Project is located.
- This report will not include a review of the potential impact of seismic activity (e.g., earthquakes) on the Project and its operations as these events are associated with, and induced by, seismic activity and therefore not considered a physical climate change event/hazard; and
- Although this review highlights potential risks associated with the Project's facilities, this preliminary review was undertaken at a high level and should be regarded as such.

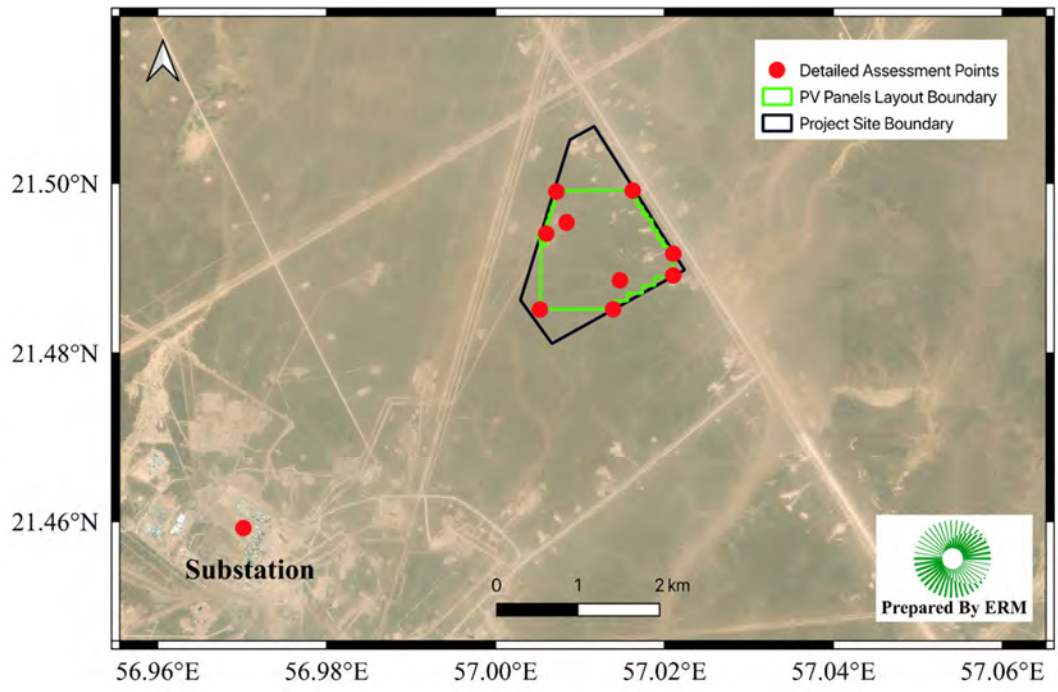
[5] IPCC. (2021). Summary for Policymakers. IPCC AR6 WG1.Retrieved from: https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf

6. CCRA RESULTS

6.1 SITE LOCATION

The North Oman Solar (NOS) Site is in northern Oman within the Ad Dakhiliyah Governorate, approximately 270 km southwest of Muscat. ERM conducted a high-level physical risk screening of the Project site, as illustrated in Figure 6.1, and provided comprehensive findings (in-depth analysis) of the most vulnerable location.

FIGURE 6.1 PROJECT SITE MAP



6.2 KEY FINDINGS OF CCRA

Table 6.1 exhibits the risk scores for the most vulnerable location, demonstrating its vulnerability to various physical hazards and the presence of high-risk scores. The risk scores in Table 9 were calculated using ERM's CIP and are escorted by their respective categories and threshold values as outlined in Table 4.6 and Table 4.7. Among the nine (9) climate hazards assessed, the site seems to be prone to extreme heat, extreme rainfall flooding, tropical storms, and water stress.

The likelihood of extreme heat is expected to increase moderately to significantly under the considered scenarios in future time frames. The associated risk is categorized as "**Moderate**" during the Baseline but is projected to become "**Very High**" in the future time horizons under the SSP1-2.6 and SSP5-8.5 scenarios, respectively.

The risk score allied with riverine flooding is "**Minimal**" and is likely to remain the same in future time horizons under the scenarios considered. As mentioned in the hydrological report, the Site is situated near a major wadi flow path on the eastern side; therefore, a hotspot

analysis is carried out in the following sub-sections to understand the site locations susceptible to riverine flooding.

The risk associated with extreme rainfall flooding is also "**Minimal**" in the Baseline. The risk category remains the same in the future time frames under considered scenarios, indicating "No Change." Furthermore, in the following sub-section, a hotspot analysis is performed to understand the site locations vulnerable to extreme rainfall flooding.

The risk associated with extreme winds and storms is "**Low**" in the Baseline and is expected to remain in the same category in both future time horizons under the considered scenarios.

Water stress-allied risk is "**Very High**" in the Baseline and is likely to remain the same by the 2030s and 2050s under the considered scenarios.

The risk associated with coastal flooding and landslides is considered "**Minimal**" in the Baseline and is likely projected to remain the same by the 2030s and 2050s under both scenarios.

Extreme cold shows a minimal to moderate decrease in risk in the future time horizons under the scenarios considered. Given that the site is in Oman, having an annual minimum temperature of 21.71℃ and a minimum of daily minimum temperature of 10.7℃, one can eliminate it as a potential climate risk to the site.

Wildfire-associated risk is based on number of days with fire-permitting climatic conditions (that considers record of dryness, rainfall, and evapotranspiration rate, along with meteorological variables for wind speed, temperature, and humidity) and is "**Very High**" in the Baseline and is likely projected to be the same in the future time horizons. The historical data conveys no burned area within the vicinity of the asset location, even though the climatic conditions show a High Baseline risk, and the satellite imagery also reveals that the location is not surrounded by dense vegetation (in agreement with the hydrological report, which mentions that most of the site is sparsely vegetated, having scattered small shrubs confined to wadi flow paths.) Hence, one can eliminate it as a potential climate risk to the site.

TABLE 6.1 CLIMATE RISK SCORES

Event Type	Baseline Risk	SSP1-2.6		SSP5-8.5	
		2030s	2050s	2030s	2050s
Extreme Heat	**Moderate** (2.32)	4.08	4.40	4.40	5.84
Extreme Cold	**Low** (1.84)	1.20	1.24	0.84	0.56
River Flooding	**Minimal** (0.00)	0.00	0.00	0.00	0.00
Extreme Rainfall Flooding	**Minimal** (0.24)	0.30	0.30	0.24	0.24
Coastal & Offshore	**Minimal** (0.00)	0.00	0.00	0.00	0.00
Extreme Winds & Storms	**Low** (1.32)	1.44	1.44	1.44	1.44
Rainfall-Induced Landslides	**Minimal** (0.00)	0.00	0.00	0.00	0.00
Water Stress & Drought	**Very High** (8.00)	8.00	8.00	8.00	8.00
Wildfires	**Very High** (6.96)	7.20	7.04	7.12	7.28

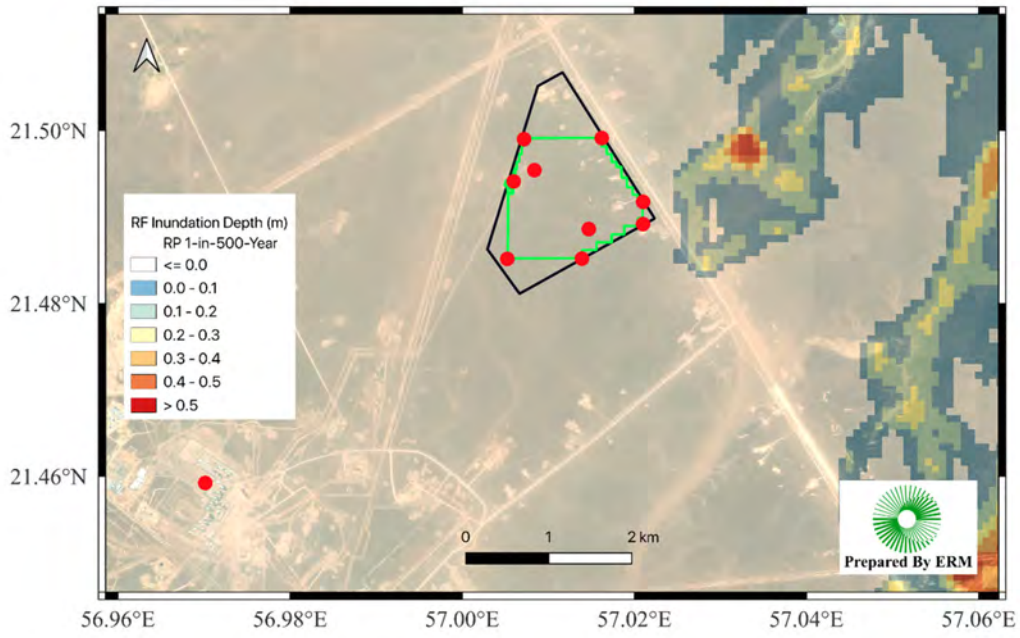
6.3 HOTSPOT ANALYSIS

Hotspot analysis involves the systematic identification and assessment of regions that are particularly vulnerable to flood events. The hotspot maps visualize regions at the most significant risk and serve as critical tools for urban planners, policymakers, and disaster management agencies. These maps facilitate targeted interventions, enabling efficient resource allocation and mitigation strategies to reduce the impact of flooding in vulnerable areas.

6.3.1 RIVERINE FLOODING (1-IN-500-Y)

A major wadi flow path is located on the eastern side of the Site, hence in-depth analysis is required. Hotspot analysis reveals no footprints of riverine flooding within the vicinity of the Site as well as in the neighboring regions of its sub-station (see Figure 6.2). However, the riverine flooding footprints are observed outside the vicinity of the Site's periphery, especially on the eastern and southeastern sides. These modelling results of the riverine flooding inundation depth are based on Fathom-2.0, a global hydrological model. For riverine flooding, a 1-in-500-year return period is considered, and inundation depth is measured in meters. The modelling grid size for riverine flooding inundation is 90m x 90m; hence, due to the wider resolution, there may be inaccuracies in the spread/severity of the floods.

FIGURE 6.2 HOTSPOT ANALYSIS OF THE BASELINE RIVERINE FLOODING (1-IN-500-YEAR)

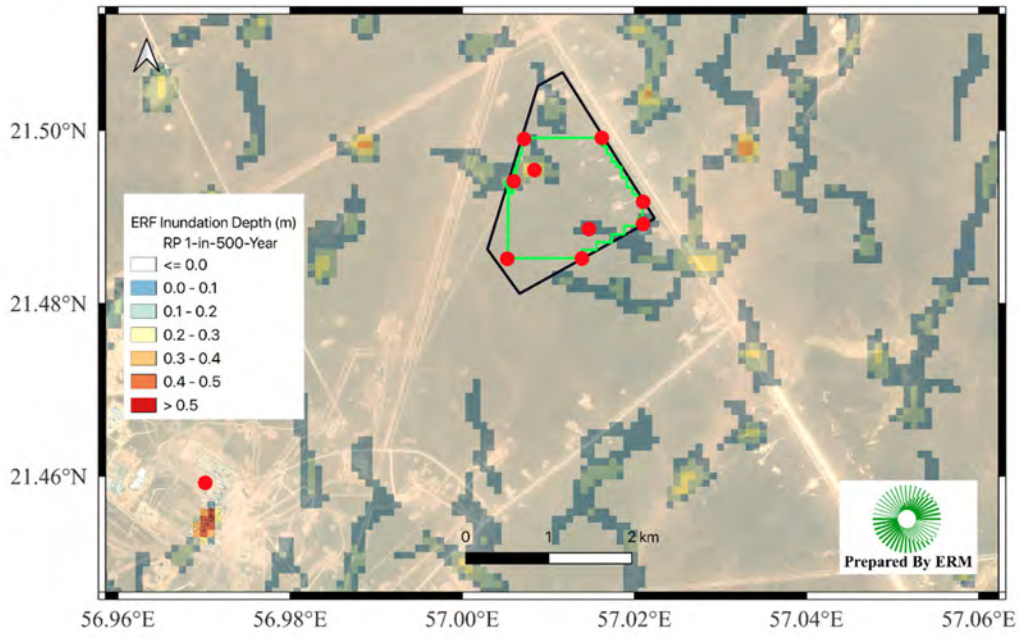


6.3.2 EXTREME RAINFALL FLOODING (1-IN-500-Y)

Hotspot analysis reveals a clear indication of extreme rainfall flooding within the Site's periphery, especially in the southeastern and northwestern sides, including the locations where the step-up substation and interface yard are situated (see Figure 6.3). Additionally, the footprints of extreme rainfall flooding are also observed outside the Site's vicinity as well as on

the southern side of its sub-station. These modelling results of the Extreme Rainfall Flooding inundation depth are based on Fathom-2.0, a global hydrological model. For extreme rainfall flooding, a 1-in-500-year return period is considered, and inundation depth is measured in meters. The modelling grid size for extreme rainfall flooding inundation is 90m x 90m. Hence, there may be inaccuracies in the spread/severity of the floods due to wider resolution.

FIGURE 6.3 HOTSPOT ANALYSIS OF THE BASELINE EXTREME RAINFALL FLOODING (1-IN-500-YEAR)



6.4 BASELINE AND FUTURE PROJECTIONS OF KEY CLIMATIC VARIABLES

This section provides the baseline values of crucial climatic variables associated with the hazards identified and how they will change in future time horizons (i.e., 2030 and 2050s) under the considered scenarios (i.e., SSP1-2.6 and SSP5-8.5), for details see Table 7.1. The background data enables a comprehensive understanding of long-term weather patterns and climatic trends, which is crucial for identifying and addressing the impacts of climate change. This background climate data is vital for informed decision-making in various sectors. For instance, it helps in understanding the extreme limits that an asset can withstand extreme weather events, thereby enhancing its resilience. Additionally, it helps develop effective strategies to mitigate their impact.

TABLE 6.2 KEY CLIMATIC VARIABLES

Variables	Baseline	SSP1-2.6		SSP5-8.5	
		2030	2050	2030	2050
Warm Spell Duration Index (WSDI) (in Days)	47.2	113.2	127.3	128.8	209.8
Maximum 1-day Rainfall (Rx1day) (in mm)	23.91	36.02	29.5	31.76	30.66
Maximum 5-day Rainfall (Rx5day) (in mm)	39.24	67.84	55.38	78.1	78.1
Maximum Daily Maximum Temperature (TXx) (in ℃)	41.22	41.75	42.32	42	43.03
Minimum Daily Minimum Temperature (TNn) (in ℃)	10.7	11.31	12.16	11.99	13.02
Extreme Rainfall Flooding Inundation Depth (in m)	0.29	0.31	0.32	0.29	0.28
River Flooding Inundation Depth (in m)	0	0	0	0	0
Extreme Winds & Storms (in knots)	67	70.92	71.45	71.18	73.28

The maximum of daily maximum temperature during the Baseline is 41.22℃, and it's likely projected to increase by 1.81℃ in the 2050s, under the high emission scenario. Additionally, the warm spell duration index is 47.2 days in the Baseline, and under the considered scenarios, it will likely upsurge by 2.40 and 2.73 times in the 2030s and 2.70 and 4.45 times in the 2050s. Under the high emission scenario, the wind associated with tropical storms is also likely projected to increase by 4.18 knots in the 2030s and 6.28 knots in the 2050s. Compared to the Baseline, the inundation depth allied with extreme rainfall flooding shows a slight increase in future time horizons under the SSP1-2.6 scenario and remains more or less the same under the SSP5-8.5 scenario.

7. SUMMARY AND NEXT STEPS

Table 7.1 presents the high-level hazard implications for various project components corresponding to Sites.

It is recommended that all risks identified within this report are reviewed in further detail within follow-on phases of assessment with particular consideration being given to the most material risks – as listed above.

Further assessment associated with Phase 2 of this CCRA is anticipated to include:

- An initial re-review of all risks identified within this report, against any updates which have been made to the Project's design to manage/mitigate each risk (including an assessment of each risks residual risk level) - to assess whether risks are still considered potentially material.
- The financial quantification of any residual risks which are still considered potentially material.
- Collaboration with the Client to ensure that estimations of the financial impact of each risk are representative.

Once risks have been quantified, the Client will have the opportunity to implement further management/mitigation measures into the Projects design to further manage material risks. Following this, to fully align with EP4's 2023 Guidance Note, during later stages of the Project, the Client will be required to financially quantify the risks which have been identified in Phase 1 as potentially material to the Project (Phase 2) and; how these risks are being managed/mitigated within a Climate Change Risk Management Plan (CCRMP) (Phase 3).

TABLE 7.1 SUMMARY AND NEXT STEPS

Climate Hazard	Hazard Category	Risk Area	Potential Impact	Implications	Recommended Risk Mitigation Measures
Extreme Heat	Acute / Chronic	Associate and Supporting Facilities	Physical damage to assets	• Extreme heat is expected to pose a high risk to solar power plants, including reduced efficiency, decreased power output, component degradation, increased maintenance costs, and operational risks. • Higher temperatures can reduce the efficiency of photovoltaic cells, thus reducing electrical output. This reduction can impact the ability of the solar power plant to meet electricity demand, which may result in decreased revenue for plant operators. • Extreme heat can cause operational risks for solar power plants, i.e., overheating of electrical components, increased risk of fires, and health and safety risks to site personnel working outdoors. • Extreme heat can cause the expansion/contraction of materials, leading to potential damage to solar panels. As a result, photovoltaic cells degrade more rapidly, which reduces their lifespan and overall durability. • High temperatures can increase the resistance in transmission lines, leading to energy losses during transmission. • Can cause the expansion of conductors in transmission lines, which leads to sagging. • During extreme heat events, there may be an increased energy demand for	• Invest in solar panels made from materials designed to withstand higher temperatures without losing efficiency. • Ensure sufficient airflow beneath panels for cooling. For example, mounting panels slightly above the surface can create a small air gap that helps dissipate heat. • Upgrading transmission infrastructure to withstand extreme weather events, such as using stronger materials to reduce vulnerability. • Implement Dynamic Line Rating (DLR) systems that optimize the use of transmission lines by adjusting power flow based on real-time conditions, such as temperature and wind speed.

Climate Hazard	Hazard Category	Risk Area	Potential Impact	Implications	Recommended Risk Mitigation Measures
				cooling indoor areas for equipment and personnel, which can increase costs.	
		Site Personnel	Impact on workers	• Prolonged exposure to high temperatures can lead to fatigue, heat stress, heat stroke, dehydration, etc., thus affecting the overall health of employees working at the site. • Cause reduction in the physical work capacity/efficiency, leading to lower productivity levels.	• Develop comprehensive heat emergency response plans outlining protocols for addressing heat-related emergencies and providing medical assistance if needed. • Ensure a heat stress management plan covers outdoor workers and employees. • Implement mandatory rest breaks in shaded or air-conditioned areas to allow workers to cool down. • Provide water and electrolyte drinks at regular intervals to prevent dehydration. • Rotate worker's shifts frequently to limit their exposure to extreme heat. • Conduct heat awareness training programs to educate employees about heat-related risks and the importance of staying hydrated.
Flooding	Acute	Associate and Supporting Facilities	Physical damage to assets	• Flooding can significantly impact solar power plants, affecting their performance, durability, and financial viability. • Floodwater can damage electrical components such as inverters,	• Where feasible, relocate infrastructure at risk of flooding to areas with lower flood risk. This option is the most advisable, as it reduces the

Climate Hazard	Hazard Category	Risk Area	Potential Impact	Implications	Recommended Risk Mitigation Measures
				transformers, and control systems. Water ingress can cause short circuits and corrosion, leading to malfunctions or complete failure. • Prolonged submersion can physically damage solar panels, as floodwater can carry debris that may scratch or shatter them. • Flood waters can challenge the structural integrity of solar panels, especially the ground-mounted systems, causing misalignment or collapse. • Flooding can hinder repair/maintenance efforts, leading to prolonged downtime and increased costs for restoring normal operations. • Flooding can reduce power generation by reducing the ability of solar panels to capture sunlight efficiently. Further, damage to electrical systems can halt power production. • Floodwaters can carry contaminants that may corrode metal parts. If solar panels or batteries are damaged, hazardous materials could be released into the environment. • The cost of repairing/replacing damaged equipment, including the labor and material costs associated with restoration, can be substantial. • Reduced/halted power generation results in revenue loss.	cost of implementing flood protection measures. • Recommended flood protection measures: ○ Installing electrical components and critical infrastructure above potential flood levels to prevent water damage. ○ Backfilling depressions to the natural ground level to avoid water accumulation. ○ Constructing barriers or levees around the plant to prevent floodwaters from reaching critical areas. ○ Effective drainage systems can help divert floodwaters from the plant, reducing the risk of damage. ○ Implement low-water crossings (Irish type) to prevent site road crossings from flooding. ○ Elevating substations and critical components above-expected flood levels. ○ Installing pumps in low-lying areas to quickly

Climate Hazard	Hazard Category	Risk Area	Potential Impact	Implications	Recommended Risk Mitigation Measures
				• Repeated or severe flooding can lead to increased insurance premiums or difficulty obtaining coverage. Insurers may impose higher costs due to the perceived increased risk. • It can cause physical damage to transmission infrastructure, substations, and underground cables.	remove accumulated water. • Conduct routine inspections and maintenance to identify vulnerabilities and ensure that protective measures are functioning properly. • Obtain comprehensive insurance coverage that also includes flood damage to mitigate financial risks.
		Site Personnel	Impact on workers	• Floodwaters can lead to short circuits and other electrical hazards. • Floodwaters can make it difficult for workers to access the site, disrupting maintenance and operational activities. • Floodwaters can spread contaminants, thus affecting the local environment and worker's health.	• Develop emergency response plans, outlining specific actions to be taken during flood events. • Train staff on emergency procedures and conduct regular drills to ensure readiness. • Implement effective drainage systems to redirect water from the Site.
Water Stress	Chronic	Associate and Supporting Facilities	Physical damage to assets	• Water scarcity may not directly impact the physical infrastructure but can affect the operations of Solar Power plants. • Solar panels require regular cleaning to maintain optimal performance. In regions with water scarcity, access to enough water for cleaning can be limited or expensive, leading to a decrease in operational efficiency and energy output due to the build-up of dirt and dust	• If water is needed for operations, consider using non-potable sources like treated wastewater or greywater to reduce the demand for local freshwater supplies. • Deploy robotic cleaning systems that can operate with minimal water or use no water at all.

Climate Hazard	Hazard Category	Risk Area	Potential Impact	Implications	Recommended Risk Mitigation Measures
				obstructing sunlight from reaching the photovoltaic cells. • The cost of water may also go up. The exposure could be rated low depending on how the panels are cleaned, e.g., AI robots use comparatively less water than manual cleaning. • Water scarcity may also trigger regulatory considerations for the developers/operators of solar power plants. Government authorities may impose restrictions on water usage and necessitate the implementation of water-saving technologies.	• Identify alternate water sources to ensure uninterrupted water supply during periods of water stress. • Explore opportunities for rainwater harvesting at the site and within a wider watershed area. • Comply with local and national water use regulations to avoid legal issues and ensure sustainable water practices. • Develop and implement water conservation policies and practices within the solar power plant operations. • Implement systems to regularly monitor water usage to identify leaks, wastage, or inefficiencies.
		Site Personnel	Impact on workers	• There may be a health and safety risk for site personnel if there is not adequate drinking water supply. • Water stress can exacerbate the risk of heat-related illnesses such as heat exhaustion and heat stroke in hot climates. • Insufficient water for sanitation can lead to poor hygiene, thus increasing the risk of infections and illnesses.	• Implement systems to recycle/reuse water for cleaning and cooling purposes. • Ensure workers have an ample supply of drinking water and encourage regular hydration breaks. • Implement programs to educate workers and local communities on water conservation practices and the importance of sustainable water management.

Climate Hazard	Hazard Category	Risk Area	Potential Impact	Implications	Recommended Risk Mitigation Measures
Cyclones (Extreme winds and storms)	Acute	Associate and Supporting Facilities	Physical damage to assets	• Cyclones can pose significant challenges to solar power plant operations and maintenance. Hence, proactive measures are necessary to improve resilience, reduce risks, and ensure the long-term sustainability of solar energy infrastructure in cyclone-prone regions. • Strong winds allied with cyclones can cause extensive damage to solar panels (i.e., wrecked glasses and bent frames) that will affect the integrity and functionality of the panels. • Can interrupt the normal operations of solar power plants by causing power outages, damage to electrical components, and disruptions in grid connectivity, leading to decreased energy production and revenue loss. • Can cause structural damage to mounting systems, support structures, and other components. • Cyclones and high winds can cause direct physical damage to transmission lines, i.e., breaking of cables and damaging substations. • Flying debris can strike transmission lines, causing breaks or damaging insulation. • The operators may incur substantial costs associated with repairing/replacing of damaged equipment to restore operations to normalcy. • Cyclones can cause prolonged downtime of solar power plants, leading to a loss in	• Mounting structures and support systems of solar panels should be designed to withstand high wind and debris impact, i.e., using materials and engineering standards that adhere to local building codes and regulations. • Develop and implement cyclone-specific emergency preparedness and response plans and establish protocols for securing equipment, evacuating personnel, and shutting down operations safely in advance. • Installing power backups, i.e., battery storage and/or diesel generators, to maintain key operations during the time of power outages caused by cyclones. • Stay informed about evolving weather conditions and take proactive measures regarding the potential impacts of Cyclones on solar power plant operations. • Obtain appropriate insurance for cyclone-related risks and losses and work closely with insurers to understand policy

Climate Hazard	Hazard Category	Risk Area	Potential Impact	Implications	Recommended Risk Mitigation Measures
				productivity and revenue generation during the period. • Insurance premiums may increase in cyclone-prone regions due to the higher risk associated with operating solar installations.	terms and conditions, coverage limits, and claim procedures.
		Site Personnel	Impact on workers	• High winds and flying debris can cause physical injuries to workers. • Flooded or blocked roads can prevent workers from reaching the site or evacuating if necessary. • Floodwaters can carry contaminants, potentially impacting both the environment and worker health.	• Provide training to staff members on cyclone safety, emergency procedures, and first aid. • Ensure that there are robust, cyclone-resistant shelters on-site where workers can take shelter during a storm. • Use cyclone-resistant designs for buildings and critical infrastructure to withstand high winds and flooding. • Run awareness programs to inform workers about the risks of cyclones and the importance of following safety protocols.

8. CONCLUSIONS

Physical hazards can significantly impact the operation and efficiency of solar power plants, posing challenges to both their infrastructure and energy production capabilities. For example, extreme heat can degrade the efficiency and lifespan of photovoltaic cells and associated facilities thus reducing overall energy production; flooding can inundate critical infrastructure (i.e., inverters and electrical systems) leading to operational failures and costly repairs; cyclones and high winds can threaten the structural integrity of solar panels and mounting systems, potentially causing extensive physical damage and prolonged downtime; and water stress impacts the water availability for cleaning solar panels, essential for maintaining their efficiency. Thus, effective mitigation strategies, including robust design, regular maintenance, and comprehensive risk assessment, are essential to ensure the resilience and reliability of solar power plants in the face of these physical hazards.

In this report, ERM analyzed climate hazards that could pose a physical risk to the Site under current climate conditions (referred to as Baseline) as well as two future time periods (2030s and 2050s) under low (SSP1-2.6) and high (SSP5-8.5) emission scenarios.

Figure 8.1 illustrates the risk scores for the most vulnerable location across the Site, which is prone to various physical hazards and has higher risk scores. The hazards such as extreme heat, extreme rainfall flooding, riverine flooding, extreme winds and storms, and water stress emerged as significant concerns, or "Red Flags," for the Project Site, as highlighted in Table 8.1 Extreme heat, tropical storms, and water stress are expected to impact the entire project site. Additionally, as indicated by the hotspot analysis, riverine flooding is unlikely to affect the locations within the Site's periphery. However, footprints of riverine flooding are observed outside the vicinity of the Site, especially on the eastern and southeastern sides. Furthermore, the hotspot analysis for extreme rainfall flooding illustrates inundation within the Site's periphery, especially in the southeastern and northwestern sides, including the locations where the step-up substation and interface yard are situated. Moreover, the regions outside the Site's periphery and the southern side of its sub-station are also prone to extreme rainfall flooding.

FIGURE 8.1 RISK SCORES CORRESPONDING TO SOLAR SITE

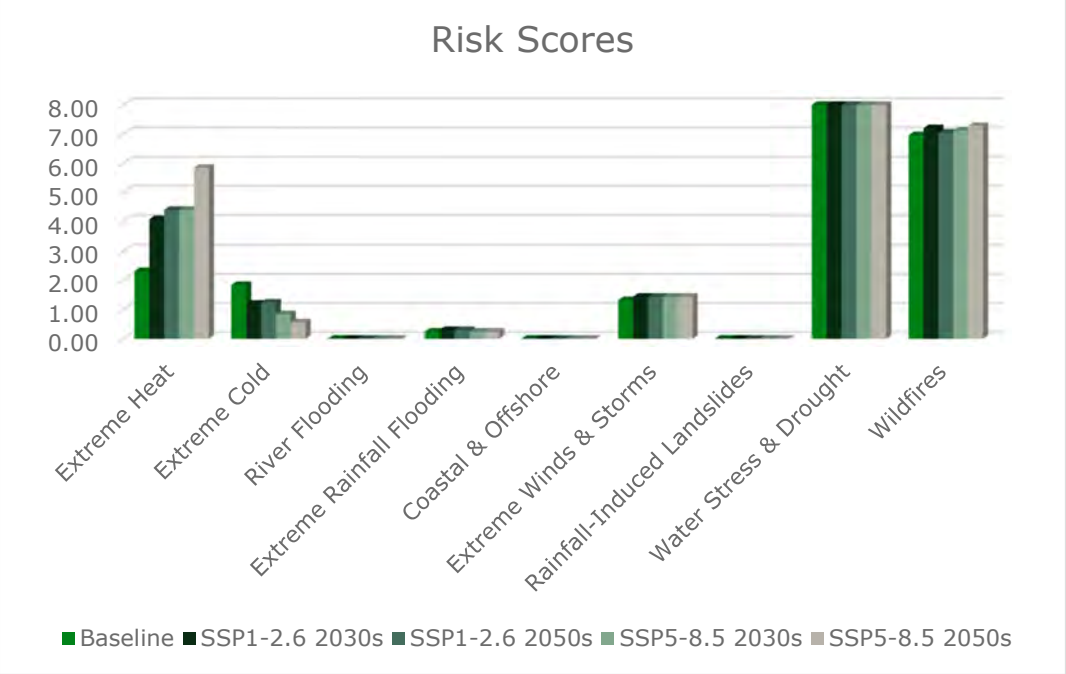


TABLE 8.1 RED FLAGS RESULTS FOR SOLAR SITE

S. No.	Climate-related Risk (Red Flags)		Vulnerable Locations
1.	Extreme Heat		Likely to impact the complete Site
2.	Riverine Flooding		Unlikely to affect the facilities within the Site's periphery; however, inundation footprints are observed outside the Site's vicinity, particularly on the eastern and southeastern sides
3.	Extreme Rain Flooding		Likely to impact the facilities within the Site's periphery, especially the ones located on the southeastern and northwestern sides (including step-up substation and interface yard) as well as the southern side of its sub-station
4.	Extreme Winds & Storms		Likely to impact the complete Site
5.	Water Stress		Likely to impact the complete Site

The key findings of this assessment are:

- In future time horizons, extreme heat is projected to increase moderately to significantly under the considered scenarios (i.e., SSP1-2.6 and SSP5-8.5). The associated risk is categorized as "**Moderate**" during the Baseline but is projected to become "**Very High**" in the future time horizons under the scenarios considered. There is no significant difference

in the Baseline and projected risk scores across the Site. Hence, it is important to design the photovoltaic cells and associated facilities across the Site to withstand such extreme temperatures.

  - The maximum of daily maximum temperature during the Baseline is 41.22℃ and is projected to increase by 1.81℃ in the 2050s under the high emission scenario.
  - The warm spell duration index is 47.2 days in the Baseline, and under the considered scenarios, it will likely increase by 2.40 and 2.73 times in the 2030s and 2.70 and 4.45 times in the 2050s.

- The riverine flooding-allied risk is "**Minimal**" in the Baseline and is likely to remain the same in future time frames under both scenarios. The footprints of riverine flooding are observed outside the Site's vicinity, particularly on the eastern and southeastern sides, indicating that the facilities located inside the Site's periphery are unlikely susceptible to riverine flooding. However, considering the fact that the hotspot analysis shows inundation on the eastern and southeastern sides, proper measures need to be taken to reduce the potential impact.
- The risk associated with extreme rainfall flooding is also "**Minimal**" in the Baseline and remains the same in future time frames under considered scenarios, implying "No Change." The footprints of extreme rainfall flooding are observed within the Site's periphery, especially in the southeastern and northwestern sides (including the step-up substation and interface yard), indicating that the Site is vulnerable to extreme rainfall flooding. Additionally, inundation is also observed in the neighboring regions beyond the Site's periphery as well as on the southern side of its sub-station. Hence proper measures need to be taken to reduce the potential impact.
- The risk associated with extreme winds and storms is "**Low**" in the Baseline and is expected to remain the same in the future time horizons under the considered scenarios. Even though the risk associated with it is "**Low**," wind speed is projected to intensify further (~9.37% increase from the Baseline to 2050 under the SSP5-8.5 scenario). Hence, during the design stage it is recommended to assess the capability of the plant to withstand these impacts and understand the resilience.
  - Under the high emission scenario, the wind associated with tropical storms is likely projected to increase by 4.18 knots in the 2030s and 6.28 knots in the 2050s.
- Water Stress allied risk is "**Very High**" in the Baseline and is likely projected to be the same by the 2030s and 2050s under the considered scenarios. Water stress may not directly impact the physical infrastructure but can affect the operations of Solar Power plants. Therefore, to mitigate adverse impacts, it is recommended to ensure sustainable water management practices.
- The risk of coastal flooding and landslides is considered "**Minimal**" in the Baseline and is likely projected to remain the same by the 2030s and 2050s under both scenarios.
- Wildfire-associated risk is based on the number of days with fire-permitting climatic conditions and is "**Very High**" in the Baseline and is likely projected to remain the same in future time horizons. The historical data conveys no burned area within the vicinity of the asset location, even though the climatic conditions show a High Baseline risk, and the satellite imagery also reveals that the location is not surrounded by dense vegetation. Hence, one can eliminate it as a potential climate risk to the site.

Extreme cold shows a minimal to moderate decrease in risk in the future time horizons under the scenarios considered. Given that the site is in Oman, with an annual minimum temperature of 21.71℃ and a minimum of daily minimum temperature of 10.7℃, one can eliminate it as a potential climate risk to the site.

APPENDIX E DESIGN CHANGE MANAGEMENT PROCEDURE (DCMP)

CONTENTS

LIST OF FIGURES

1. INTRODUCTION

The Environmental and Social Impact Assessment (ESIA) for the "North Oman Solar PV Project in Oman" (hereafter 'the project') was prepared based on the design information available at that time (August 2024) as provided by TotalEnergies's engineering team. As stated within the ESIA and as usual for projects of this scale, further design development, including possible changes to the detailed footprint, is to be undertaken.

This Design Change Management (DCM) Procedure sets out how the environmental and social implications of the design development will be assessed. The assessment of the design will aim to ensure that adequate E&S mitigation is adopted to minimise and avoid impacts where any deviations to the scheme described in the ESIA are proposed.

As is typical in project development, it is expected that there could be changes required to some design aspects of the Project. Each project usually has an overall DCM Process that considers not just E&S topics, but also financial, construction, programme aspects of a proposed design change (DC). The procedure set out in this document describes how the E&S aspects (i.e., those covered in the ESIA) are to be assessed and will become an integrated part of the overall decision-making process for reviewing DCs.

Many DCs will be of a purely technical nature with little/no ESIA-relevance and many other DCs are expected to fall within the areas and issues already covered by the ESIA and the ESMMP. It should be kept in mind that DCs can also have significant positive implications for the Project.

An overview of the DCM Procedures for Environmental and Social assessment topics is provided in Figure 2.1, and a description of the key phases is also provided.

1.1 ACRONYMS, ABBREVIATIONS AND DEFINITIONS

The following acronyms, abbreviations and definitions apply to this document.

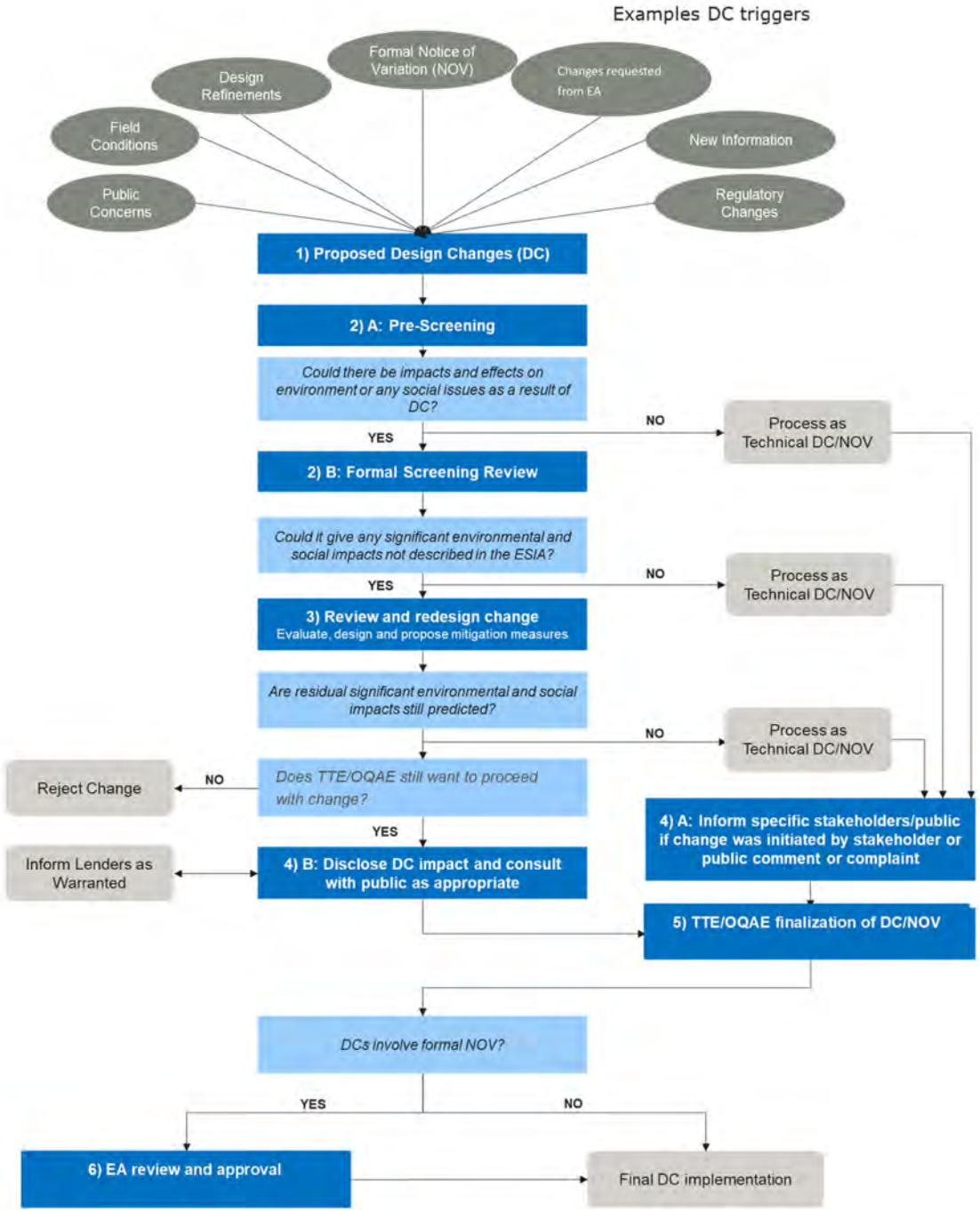
TERM	DEFINITION
CONSULTANT (S)	TotalEnergies's Environmental and Social Specialist Subcontractor(s).
DC	Design Change
CONTRACTOR	TotalEnergies
DCMP	Design Change Management Procedure
E&S	Environmental and Social
ESIA	Environmental and Social Impact Assessment
HSE	Health, Safety and Environmental
NOV	Notice of Variation[1]
OHS	Occupational Health and Safety
PROJECT	North Oman Solar PV
PROJECT APPROVER	Oman's Environmental Authority (EA) and Lenders
PROJECT OWNER	TotalEnergies Renewables Development Middle East LLC (TTE) OQ Alternative Energy LLC (OQAE) Petroleum Development Oman LLC (PDO, the "Off-taker")

[1] A Notice of Variation (NoV) involves additional budget request and, therefore acceptance by the Project Approver/Project Owner.

2. DCMP FLOWCHART

An overview of the DCMP for E&S topics is provided in Figure 2.1 below, followed by a description of the key steps in the process.

FIGURE 2.1 DCMP FLOWCHART



3. DESIGN CHANGE PROCESS

The following steps correspond with those shown in the DCMP Flowchart above.

3.1 STEP 1: TRIGGERS FOR PROPOSED DESIGN CHANGES

Potential design changes (DCs) can be triggered at various stages of the Project implementation (e.g., Planning/Detailed Design, Construction,) and by the various organisational parties shown in Figure 1, e.g.:

- Basic design refinement, e.g., by TTE/OQAE engineers/planners;
- Detailed design development, e.g., by Subcontractors on Oman's Environmental Authority (EA) approved designs;
- Field obstacles during construction that were not spotted/detected during the preliminary analysis;
- Results of further field surveys (e.g., bird survey and collision risk modelling) and monitoring;
- Results of pending social baseline data gathering (e.g. meetings with PDO) or comments/concerns submitted by public/stakeholders/lenders;
- Changes in regulations/comments by regulatory bodies (e.g. EA); and
- Requests from EA and/or PDO.

Regardless of the trigger source, any potential DC must formally be processed through the DCMP.

3.2 STEP 2A: PRE-SCREENING

"Pre-Screening" will be partially performed by TTE/OQAE's survey team through an E&S Checklist (see Appendix A) based on the main Project risks and ESIA findings. After completion, this Checklist will be submitted to the Project's Quality and Environmental Manager for review and approval. This will mean that depending on the inputs of the surveyors, DCs that are clearly of no relevance to environmental or social topics - or having very minor implications for the Project implementation - will not be subject to further Screening. If the change being analysed has no environmental or social impact, the change will be processed as a Technical Design Change / Notice of Variation (NOV).

3.3 STEP 2B: FORMAL SCREENING REVIEW

A desk-based "Screening-Review" will be performed for any proposed DCs that in the opinion of TTE/OAQE's Quality and Environmental Manager have the *potential* to give rise to new or additional significant impacts (positive or negative) which differ to those as presented in the ESIA Report. The Screening will cover the following criteria *inter alia*:

a) Compliance with national, international and lenders environmental and social standards;

b) Compliance with relevant health & safety regulations and standards;

c) Compliance with ESIA-related legal standards and permit requirements/conditions;

d) Any new impacts on current stakeholders and impact to new/additional stakeholders (e.g., beyond that already considered in the ESIA);

e) Any expansion of Project footprint affecting sensitive environmental or social receptors (e.g., beyond that already reflected in the ESIA);

f) Impacts on cultural heritage/archaeology; and

g) Any new/different ESIA-related item/topics that are not already appropriately addressed in the ESIA.

The Screening will be performed by/under the direction of the TTE/OQAE Project Quality and Environmental Manager, with involvement as warranted of other internal TTE staff and/or the external Consultants specialized in Environmental and Social services. Screening results will be logged and recorded in a suitable format (to be determined). The Screening results will be available for review by the lenders and their advisors.

The potential outcomes of the DC Screening can be grouped as follows:

- **No Significant Environmental and/or Social Impacts** – where there are no significant implications or additional negative impacts identified as compared to the items addressed in the ESIA Report and a change does not trigger additional/new mitigation measures. As such, the screening results will be logged, and the NOV (Notice of Variation) will be further evaluated and processed on basis of the technical, cost and other non-ESIA factors.
- **Significant Environmental and/or Social Impacts** - where there are significant or potentially significant implications with respect to ESIA-related topics that cannot be readily quantified or mitigated and were not already addressed in the ESIA (and/or pose significant reputational exposure). In this case the screening results will be logged, and a "DC Screening Matrix" exercise will be undertaken (see Appendix B below).

3.4 STEP 3: REVIEW AND REDESIGN CHANGE

For those proposed DCs for which the Screening suggests significant/potentially significant ESIA-related impacts, TotalEnergies's Quality and Environmental Manager will undertake appropriate consultation internally and with the E&S Consultants (if necessary) regarding any further mitigation or other measures (including further design development) needed to comply with the relevant ESIA standards. The determination of "significance" of a potential impact will be according to the corresponding definitions in the ESIA for the relevant environmental and social topics. If no further residual significant environmental and social impact is predicted the change will be processed as a Technical Design Change / Notice of Variation.

TTE/OQAE's Quality and Environmental Manager will keep TTE/OQAE's Project Manager informed about the E&S assessment as he or she will need to coordinate the design change with the design and engineering team. Further, the Project Manager will be responsible for leading TTE/OQAE's response in steps 4 and 5 as explained below.

3.5 STEP 4: DISCLOSE AND INFORM STAKEHOLDERS OF DESIGN CHANGE

3.5.1 INFORM SPECIFIC STAKEHOLDERS (IF NEEDED)

If the DCM Procedure was initiated on the initial suggestion of a specific project stakeholder, TTE/OQAE (and/or EA) will directly inform them about their decision.

3.5.2 DISCLOSE RESULTS AND CONSULT AFFECTED STAKEHOLDERS (IF NEEDED)

If the DC/NOV results in significant environmental and/or social impacts that cannot be readily quantified or mitigated and/or affect additional stakeholders (as compared to stakeholders already involved in the ESIA process), and TTE/OQAE still want to proceed with change, then further disclosures on local postings, flyers (and other means as appropriate) and local public consultation may be undertaken if warranted with the directly affected stakeholders.

The type and extent of disclosure/consultation will depend on the severity and scope of the DC impacts, with the intent being to ensure that the objectives and spirit of the public engagement of the ESIA process are maintained. A timeline will be proposed for receipt/inclusion of any feedback as appropriate on a case-by-case basis (as preference of not more than 15 days).

Any obligatory regulatory consent and other formal procedures will also be completed during this stage. Lenders will be kept informed of such matters at reasonable frequencies.

It should be noted that as per Permit Conditions of the Local ESIA (A) issued by EA in July 2024:

- *The company must fully comply with the provisions of the regulation (107/2023) issued by the Environmental Authority related to the project. Any changes to the project details or the addition of any units must not be made without consulting the Authority and obtaining the necessary approvals.*
- *No modifications to project details or additions of any units should be made without consulting the Authority and obtaining the required approvals.*

3.6 STEP 5: FINALIZATION OF IMPACT UPDATE AND NOV

TTE/OAQE's Project Manager, with the assistance of the Quality and Environmental Manager and Consultants and the design team, will review and compile any feedback received from lenders, public and other parties on the DC Impact Update and will prepare a final version that includes due consideration of the feedback and comments received. On a case-by-case basis, further discussions of the intended mitigation measures may be needed with stakeholders during the finalisation process.

As applicable and appropriate, specific feedback can be given to the stakeholders that have raised queries comments with respect to the DC.

3.7 STEP 6: FINAL APPROVAL

If the original DC is related to an PDO/EA approved design, then the formal NOV will be prepared, including relevant measures/considerations from the DC Impact Update, and submitted to EA for their review and approval. It should be noted that as per Permit Conditions of the Local ESIA (A) issued by EA in July 2024:

- *The company must fully comply with the provisions of the regulation (107/2023) issued by the Environmental Authority related to the project. Any changes to the project details or the addition of any units must not be made without consulting the Authority and obtaining the necessary approvals.*

- *No modifications to project details or additions of any units should be made without consulting the Authority and obtaining the required approvals.*

If the DC is not related to an PDO/EA -approved design, then TTE/OQAE will adapt the DC Impact Update to the current draft design stage and further proceed as per the internal design process.

Finally, TTE/OQAE will implement the agreed DCs and will manage associated impacts through the Project's E&S Management System, updating relevant management plans as needed.

3.8 SUMMARY

The intent of the DCMP for E&S assessment includes the following key principles:

1. The proposed DCMP for E&S related issues will be integrated by TTE/OQAE into the overall DCMP of the Project;
2. The Procedures will begin to assess design changes during design development process;
3. Significant proposed DCs must be reviewed for their E&S-relevance, and appropriate mitigation measures must be developed;
4. Proposed DCs that are irrelevant/insignificant get flagged in the internal "pre-screening" by TTE/OQAE and are not included in the further procedures;
5. Potentially significant E&S-relevant DCs undergo formal Screening and further DC Review/evaluation (with consultants and other experts, if necessary) as warranted on case-by-case basis;
6. All DC screening results are logged, and can be reviewed by lenders if desired;
7. The first preference for minimization of potential negative E&S impacts will be to review the proposed DC for alternative designs to avoid the impacts;
8. For any significant DCs for which additional mitigation measures are warranted, a DC Impact Update will be prepared and submitted to the lenders. The additional mitigation measures will be added to the relevant management plans within the Project's E&S Management System;
9. Stakeholders will be directly informed in writing where the design change process was initiated by them;
10. On case-by-case basis, further public information and potentially consultation will be implemented;
11. Proposed DCs stemming from approved PDO/EA designs must be submitted to PDO/EA for final approval.

In addition to the above, TTE/OQAE will undertake monthly reporting of the DCs (and related Screening Results and DC Impact Updates).

4. ROLES AND RESPONSIBILITIES

The following project roles are responsible for the implementation of this DCMP:

Role	Responsibilities
Survey Team	Compile E&S Screening Checklist Communication with TTE/OQAE's Project Manager and Quality and Environmental Manager
TTE/OQAE Project Quality and Environmental Manager	Review of Surveyors' E&S Checklist Implementation of Step 2A and Step 2B of the DCMP Support the Project Manager during Steps 3 to Step 5 of the DCMP. Inclusion of the additional mitigation measures into the relevant plans of the Project's E&S Management System Communication and coordination with E&S Consultant(s) (if necessary) Communication and coordination with other relevant internal and external stakeholders
Project Manager	Oversight of all Steps of the DCMP Communication with the design team and engineering team Internal coordination with the Quality and Environmental Manager Implementation of Step 3 to Step 5 of DCMP (if triggered) Communication and coordination with EA
PDO/EA representative	Final approval design of the solar farm

5. DCMP REVISION

This procedure must be revised when needed, to meet or determine the following conditions:

- Updates deemed necessary after the occurrence of a real E&S Design Change;
- Change in responsibilities and others involved in the administration of this Procedure.

APPENDIX A E&S SCREENING CHECKLIST

This checklist is an elaboration of the information provided in the ESIA assessment and provides an identification of anticipated E&S risks associated with the project.

This questionnaire is to be completed by the survey team as part of the "Pre-Screening" (Step 1 of the DCMP), during their work on the Project site to make sure that design changes proposed do not foresee environmental and social (E&S) risks.

After completion, the questionnaire will be submitted to TTE/OQAE's Project Manager and Quality and Environmental Manager. The Quality and Environmental Manager will:

- Review the inputs to the questionnaire (e.g via desktop-based sources, GIS, satellite imagery, etc);
- Compare the data with the information provided in the ESIA report; and
- Provide final decision on whether a "Formal Screening Review" (Step 2 of DCMP) is required.

Project overview			
Project title:			
Design Change ID Number:			
Description of the change:			
Name of Surveyor:			
Contact details of responsible person(s) completing this questionnaire (if assigned) for further communication			
Position	Name	Telephone Number	E-Mail Address

Site location according to the new design	**Verification**	**Comment/Remarks**
Is the site located on area prone to erosion?	Yes No Clarification needed	
Are there any particular flora or fauna species near the site?	Yes No Clarification needed	

Site location according to the new design	Verification	Comment/Remarks
Is the site located nearby any natural protected area? (e.g protected forest, critical habitat, etc)	Yes No Clarification needed	
Is the site located nearby any surface water courses?	Yes No Clarification needed	
Is the site located close to any human resources? (e.g villages, towns, settlements) If yes, how close?	Yes No Clarification needed	
Is the site located near any community infrastructure or utilities? If yes, how close	Yes No Clarification needed	
Is the site located near any area used by people for other reasons (e.g farming, grazing, recreation)? If yes, how close?	Yes No Clarification needed	
Is the site close to any cemeteries? If yes, how close?	Yes No Clarification needed	
Is the site in a flooding risk area?	Yes No Clarification needed	
Is the site close to any archaeological resources? If yes, how close?	Yes No Clarification needed	
Any other environmental and/or social observations?	Yes No	

Quality and Environmental Manager:
Final remarks

APPENDIX B EXAMPLE OF A DESIGN CHANGE SCREENING MATRIX

Example of a Design Change Screening Matrix - for potentially significant DCs (subject to revision by TTE/OQAE and to be integrated as appropriate into the overall DC/NOV procedures of TTE/OQAE for the project)

Project: E&S-topics Screening Matrix
Date of initial Matrix Preparation: *DD/month/YEAR*
Reference: DC0001 v 1.00 – *(as per TotalEnergies nomenclature)*
Name of TTE/OQAE's responsible person: *e.g. EHS Manager XX*
Summary of Proposed Design Change (Attach details as appropriate): *INSERT Short-Name of DC/NOV (Example - reconfiguration of Laydown area in coordiatexx)* *GIVE SHORT DESCRIPTION of proposed DC/NOV: Example: Contractor proposes to* *…See drawing no.s. …….. (attached)*

Appraisal criterion	Appraisal of Design Change implication/potential measures to avoid/minimise the impacts	Resulting Significant change* (Y/N)	Resulting Change to Management Plan (Y/N) If yes, please specify title of MP.
a) Compliance with Project Env and Social Standards:			
Environmental issues: air and noise water and soils biodiversity landscape			
Social issues: land use community disruption socio-economic impact			
b) Compliance with community or occupational Health and safety aspects			
c) Compliance with Legal and permitting issues			
d) Land-take impacts			
e) cultural heritage/archaeology			

Project: E&S-topics Screening Matrix		
f) Other relevant factors		
* material issues eg defined as potential significant E&S impacts that cannot be readily quantified or mitigated and/or have material, scheduling, reputational or other impacts		
Summary and Conclusions by TTE/OQAE : Further DC Review is warranted for this proposed DC? Yes___ No_____		

APPENDIX F STAKEHOLDER ENGAGEMENT PLAN (SEP)

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LIST OF TABLES

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

Name	Description
5OES	Five Oceans Environmental Service LLC
AoI	Area of Influence
CLO	Community Liaison Officer
EA	Environmental Agency
EP	Equator Principles
EPC	Engineering, Procurement, and Construction
EPFI	Equator Principle Financial Institutions
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
GBVH	Gender-Based Violence and Harassment
GM	Grievance Mechanism
HSE	Health, Safety & Environment
IFC	International Finance Corporation
KII	Key Informant Interviews
OQAE	OQ's Alternative Energy
PDO	Petroleum Development Oman
PS	Performance Standard
RD	Royal Decree
ROP	Royal Oman Police
SEP	Stakeholder Engagement Plan
TTE	TotalEnergies

1. INTRODUCTION

1.1 OVERVIEW

This Stakeholder Engagement Plan (SEP) for the North Oman Solar PV (hereafter referred to as "the Project") was developed by ERM, in collaboration with Five Oceans Environmental Services SPC (5OES), on behalf of TotalEnergies (TTE) and OQ's Alternative Energy (OQAE) (Project Proponent). The purpose of the SEP is to guide the process of information sharing and engagement with Project stakeholders, in an honest and transparent manner, in order to build understanding, trust and support for the Project and comply with relevant Omani legislation and applicable international lender standards.

This version of the SEP has been developed as part of the Environmental and Social Impact Assessment (ESIA) work. The SEP will be reviewed and updated as the Project progresses and the understanding of the stakeholder landscape and concerns as well as of the nature and scale of social impacts.

Following the completion of the Project ESIA permitting process, the SEP will continue to be updated as necessary, but at least twice a year during the construction period and annually during operations.

1.2 SCOPE

The purpose of this document is to establish a stakeholder engagement strategy and associated SEP. This SEP has been developed to give guidance to the Project Proponent's personnel and its EPC contractors to meet the expectations of the Company, regulators, and the communities. The SEP describes the stakeholder identification process and outlines an engagement program to promote meaningful, timely, and effective engagement with stakeholders throughout the lifecycle of the Project.

This SEP provides the following:

- Description of national regulations and internal company requirements as well as applicable international standards;
- Identification and prioritization of relevant stakeholders;
- Baseline context and stakeholder engagement conducted to date;
- Proposed approach to the engagement plan with stakeholders;
- Resources and responsibilities for implementing stakeholder engagement activities;
- Description of the community grievance mechanism; and
- Description of how stakeholder engagement activities will be incorporated into the Company's overall management system.

1.3 OBJECTIVES

Stakeholder engagement is a key aspect of the ESIA process. The purpose of stakeholder engagement is to facilitate participation in the project decision-making process and to provide a platform for views to be expressed which inform the project design, identification of potential impacts and associated mitigation measures. The process involves sharing information and knowledge, understanding the concerns of others, and relationship building, thereby allowing

stakeholders to understand the risks, impacts, and opportunities of the project to achieve positive outcomes.

Stakeholder engagement is an ongoing, 'two-way' process of information sharing between Project Proponent and those that may influence or be affected by the project working to actively identify opportunities, risks and issues of concern. Engaging with stakeholders must be undertaken from the early stages of the project and is essential for effective risk management and project delivery.

The key objectives of stakeholder engagement are summarised in Table 1.1

TABLE 1.1 OBJECTIVES OF THE PROJECT STAKEHOLDER ENGAGEMENT PLAN

Objective	Rationale
Identify relevant stakeholders for this Project.	Identify and categorize individuals or organizations that may be affected by the project or influence its implementation, noting that these factors may change throughout the project's life.
Distribute accurate Project information in an open and transparent manner.	Ensure that stakeholders, particularly those directly affected by the proposed Project, have all relevant information available to them to enable them to make informed comments and plan for the future. This helps reduce levels of uncertainty and anxiety. Information should allow affected parties to develop an understanding of potential impacts, risks and benefits and an open and transparent approach is central to achieving this aim.
Form partnerships to promote constructive interaction between all parties.	Develop relationships of trust between the Project and stakeholders to contribute to proactive interactions and avoid where possible, unnecessary conflicts based on rumour and misinformation. Identifying structures and processes to deal with conflicts and grievances allows the Project a better understanding of stakeholder concerns and expectations thereby providing opportunities to increase the Project's value to local stakeholders.
Record and address public concerns, issues and suggestions.	Document stakeholder issues, concerns and comments to allow the rationale for Project decisions to be traced and understood. Records also assist during review and audits of the Project in identifying thematic issues which may need a more holistic response, and during follow up engagements with the affected people. This approach also addresses potential concerns that stakeholder engagement is a token gesture by the developer that meets requirements but that it is not taken seriously in Project planning.
Manage stakeholders' expectations.	Expectations, both positive and negative, may not be aligned with the realities of the Project. Ensuring that expectations are kept at realistic levels (e.g., around job opportunities) limits disappointments and frustrations of directly-affected parties at later stages of Project implementation, and therefore mitigates the potential for conflict with stakeholders.
Fulfil Omani requirements as well as Project Proponent's and international standards.	Ensuring compliance can prevent potential Project delays based on procedural issues rather than substantive ones, and save the Company from any additional costs from fines.

Source: ERM, 2024

The SEP provides guidelines to manage effective and meaningful engagement with Project stakeholders. It is focused on guiding interaction and communication with international, national, regional, and local stakeholders concerned by about the development of the Project, while setting the scene for future engagement during the subsequent development, operation, and decommissioning phases. The SEP also includes a presentation of the Grievance Mechanism (GM) to be maintained by the Project Proponent to allow external stakeholders to provide their comments and concerns related to the Project.

The SEP also presents features of the management system that will underpin the implementation of the activities defined within the SEP, including information on the roles and responsibilities to be in place within the Project Proponent, arrangements around document management commitments regarding monitoring and evaluation of the communication and engagement activities.

1.4 STRUCTURE OF THIS SEP

This SEP is structured as follows:

- Section 2, *Legislation and standards*, provides an overview of the relevant legal requirements and standards the Project must adhere to regarding stakeholder engagement.
- Section 3, *Project Description for the* North Oman Solar PV Project, presents the Project in the context of production of renewable energy in Oman.
- Section 4, *Stakeholder Identification and Analysis*, outlines Project stakeholders and provides an initial mapping based on their influence on and interest in the Project and the impacts associated with the Project.
- Section 5, *Stakeholder engagement conducted to date and Social Issues Analysis*, presents the main stakeholder related risks and opportunities that may have a significant influence on the success of the Project both during scoping and ESIA phases.
- Section 6, *Stakeholder Engagement Program*, presents the stakeholder communication and engagement activities that will be taken forward during the ESIA permitting process. This section also presents the key tools to be used to support successful communication and engagement for the Project.
- Section 7, *Grievance Mechanism* presents the grievance process to be implemented by the Project to manage external grievances.
- Section 8, Roles and Responsibilities, presents the roles and responsibilities for the implementation of this SEP.
- Section 9, *Monitoring and Reporting*, establishes the arrangements around document management and monitoring activities in relation to the SEP.

2. LEGISLATION AND STANDARDS

The stakeholder engagement activities introduced in this SEP will be conducted in accordance with:

- The regulatory requirements in Oman;

- The International Finance Corporation (IFC) Performance Standard 1 (PS1) Assessment and Management of Environmental and Social Risks and Impacts, PS5 Land Acquisition and Involuntary Resettlement, and PS8 Cultural Heritage; and
- Equator Principles (EP IV), in particular EP2 Environmental and Social Assessment and EP5 Stakeholder Engagement.

Under IFC / EP Environmental and Social Policy, the Project is assumed to be a **Category B project**. This means that the Project Proponent, as Project owner, is required to develop a full ESIA to evaluate any potential future environmental impacts associated with the Project, identify potential environmental improvement opportunities, and recommend any measures needed to prevent, minimize, and mitigate any adverse impacts.

The Project corresponds to a Category A according to Environment Authority Decision (EAD) 107/2023, which holds a different categorization scheme than IFC/EP.

2.1 LEGISLATIVE FRAMEWORK ON STAKEHOLDER ENGAGEMENT

Omani requirements regarding stakeholder engagement include:

- The Royal Decree (RD) 114/2001 relative to the Conservation of the Environment and the Prevention of Pollution (supersedes RD10/82) requires an EIA to be conducted for the Project in order to identify potential environmental and social impacts and define mitigation measures.
- The Omani legislation does not establish any legal requirements regarding Stakeholder Engagement. The only guidance is provided through Environmental Authority (EA) Guidelines. According to EA Guidelines:
  - The Ministry Guidelines on Environmental Impact Assessment mentions that "the proponent in consultation with the Ministry should determine who is interested in the project, what their concerns are, and how the concerned parties should be involved in the EIA";
- It also indicates the importance of "public information" and the importance of an "open and balanced EIA Process". Ultimately, the level of engagement will be determined in agreement with the regulator or the ministry in charge of the project.

2.2 INTERNATIONAL LENDER STANDARDS

2.2.1 IFC PERFORMANCE STANDARDS

The IFC PS are considered a benchmark for good practice for environmental and social risk management in private sector developments. These standards require that clients engage affected communities through disclosure of information, consultation, and informed participation, in a manner commensurate with the risks to and impacts of the Project on the affected communities.

Additionally, these international standards include specific guidance on conducting stakeholder engagement both during the planning phase and through the project lifecycle.

Stakeholder engagement requirements are outlined in IFC *PS1: Assessment and Management of Environmental and Social Risks and Impacts*. The key requirements for consultation and disclosure through the life of the project are summarized in Box 5.1 hereafter.

BOX 1.1 OUTLINE OF STAKEHOLDER ENGAGEMENT REQUIREMENTS OF IFC PS1

Stakeholder Analysis and Engagement Planning
Stakeholder engagement is an on-going process that may involve, in varying degrees, the following elements: stakeholder analysis and planning, disclosure and dissemination of information, consultation and participation, grievance mechanism, and on-going reporting to Affected Stakeholders.

Disclosure of Relevant Project Information
Provide affected stakeholders with access to relevant information on: (i) the purpose, nature, and scale of the project; (ii) the duration of proposed project activities; (iii) any risks to and potential impacts on such stakeholders and relevant mitigation measures; (iv) the envisaged stakeholder engagement process; and (v) the grievance mechanism.

Consultation
The extent and degree of engagement required by the consultation process should be commensurate with the project's risk and adverse impacts, and address the concerns raised by the affected stakeholders. Effective consultation should: (i) begin early and continue throughout the project; (ii) be based on the prior disclosure of relevant and easily accessible project information; (iii) focus on engaging those who are directly affected; (iv) be free of outside interference and external manipulation; (v) enable meaningful participation; and (vi) be documented.

Informed Consultation and Participation
For projects with potentially significant adverse impacts on affected stakeholders, conduct an informed consultation and participation process. It should involve deep exchange of views and information, and an organized and iterative consultation, leading to the project incorporating into their decision-making process the views of the affected stakeholders on matters that affect them directly, such as the proposed mitigation measures, the sharing of development benefits and opportunities, and implementation issues. The process should be documented, in particular the measures taken to avoid or minimize risks to and adverse impacts on the affected stakeholders. The stakeholders should be informed about how their concerns have been considered.

External Communications
Implement and maintain a procedure for external communications that includes methods to (i) receive and register external communications from the public; (ii) screen and assess the issues raised and determine how to address them; (iii) provide, track, and document responses, if any; and (iv) adjust the management program, as appropriate. In addition, it is encouraged to make periodic reports on environmental and social sustainability publicly available.

Grievance Mechanism for Affected Stakeholders
Establish a grievance mechanism to receive and facilitate resolution of affected stakeholders' concerns and grievances about the client's environmental and social performance. This mechanism should be tailored to the project's risks and adverse impacts, with affected stakeholders as its main users. It should aim to promptly resolve concerns through a transparent and culturally appropriate consultative process that is easily accessible and free of charge, without repercussions for those raising the issues. Affected stakeholders should be informed about the grievance mechanism as part of the stakeholder engagement process.

On-going Reporting to Affected Stakeholders
Provide periodic reports to the affected stakeholders that describe progress with implementation of the project Action Plans on issues that involve ongoing risk to or impacts on affected stakeholders and on issues that the consultation process or grievance mechanism have identified as a concern to those stakeholders. The PSs require that consultation and disclosure continue throughout the project's life cycle (construction and operation phase) even after the environmental assessment is completed.

Source: ERM based on IFC Performance Standards

The IFC PSs include stakeholder engagement and consultation requirements to manage specific impacts required by IFC Performance Standards other than PS1. These are presented in Table 2.1 below.

TABLE 2.1 OTHER RELEVANT IFC PERFORMANCE STANDARDS HAVING REQUIREMENTS FOR STAKEHOLDER ENGAGEMENT

Standard	Key Components
PS 2: Labour and Working Conditions	• Sets the expectation for engaging with project workers' representatives and workers' organisations, ensuring that they receive necessary information promptly, enabling meaningful negotiation for determining working conditions and employment terms through joint agreement. • Requires providing a safe and healthy work environment. All project entities must actively engage with project workers to ensure they are informed about and understand occupational health and safety standards and how to implement them.
PS 4: Community Health, Safety & Security	• Requires assessing risks and impacts on the health and safety of affected communities throughout the project life cycle, along with proposing measures to prevent, cease, or mitigate them. This involves engaging with affected parties by adopting the community engagement process outlined in PS 1. It includes providing relevant information, including an Action Plan, in a suitable format to affected parties and government authorities to ensure they comprehend the risks fully. Moreover, it entails conducting informed consultations and actively involving affected communities, particularly for projects with the potential for significant adverse impacts on them. • Acknowledges that community engagement plays a pivotal role in establishing an effective security strategy, as maintaining positive relationships with workers and communities can serve as the primary assurance of security. To achieve this, project security arrangements should be communicated to both workers and affected communities. Furthermore, they should be involved in discussions regarding security arrangements.
PS 5: Land acquisition and involuntary resettlement	• Requires the appropriate disclosure of information, the consultation, and the informed participation of those individuals and communities that will be displaced by land acquisition and/or restrictions on land use, as well as host communities receiving those resettled, to obtain adequate information. This involves (i) consultation with all categories of affected households and communities, with particular attention to vulnerable groups, (ii) considering the views of both men and women; and (iii) ensuring that all households and communities are informed early in the planning process about their options and rights regarding displacement and compensation.
PS 6: Biodiversity Conservation and Sustainable Natural Resource Management	• Recognizes that stakeholder engagement and consultation is key to understanding biodiversity-related impacts and identifying appropriate mitigation responses. As such, the project ESIA or any follow-up biodiversity or ecosystem services-related assessment, is expected to consider the differing values attached to biodiversity and ecosystem services by affected stakeholders. • Stakeholders that should be consulted include affected communities, governmental officials, academic and research institutions, recognized external experts for the biodiversity attributes of concern, and national and international conservation NGOs, as appropriate.
PS 8: Cultural Heritage	• Recognises that consultation is an important means of identifying cultural heritage, documenting its presence and significance, assessing potential impacts, and exploring mitigation options, in

Standard	Key Components
	particular where cultural heritage is not documented or protected by law. • Requires special efforts to consult with the historical or traditional users or owners of tangible cultural heritage, especially inhabitants of the area impacted by a project, since their interests may be different than the desires expressed by competent experts or government officials. Communities not resident in the area and who may only visit the cultural heritage periodically, should also be considered. • Where continued access to cultural heritage cannot be guaranteed due to health, safety, or security considerations, alternatives to open access should be identified through community consultations.

Source: ERM based on IFC Performance Standards

2.2.2 EQUATOR PRINCIPLES

The Project is being developed in accordance with financing requirements, including the Equator Principles (EP) which are an environmental and social risk management framework voluntarily adopted by a large number of financial institutions (Equator Principle Financial Institutions - EPFIs). The fourth and latest iteration of the Equator Principles (EP IV) was published in July 2020.

The EPs emphasize that lenders involved with the Project will seek to ensure that the Project is developed in a manner that is socially responsible and reflects sound environmental management practices. They further stipulate that host country legislation must be adhered to and provide requirements for stakeholder engagement and disclosure.

Under the EP IV, the relevant principles for the Project are:

- Principle 5 "Stakeholder Engagement": demonstrate effective stakeholder engagement, as an ongoing process in a structured and culturally appropriate manner, with Affected Communities, Workers or other Stakeholders. An Informed Consultation and Participation process will be conducted in the case of potentially significant adverse impacts on Affected Communities.
- Principle 6 "Grievance Mechanism": establish as part of the Environmental and Social Management System (ESMS) an effective grievance mechanism, designed for use by Affected Communities and Workers to receive and facilitate resolution of concerns and grievances about the Project's environmental and social performance.

2.2.3 SUMMARY OF REQUIREMENTS

This SEP is aimed at meeting Lenders' requirements with regards to stakeholder engagement across the different Project phases.

In summary, the above-mentioned regulations and standards require project developers to undertake the following in relation to communicating to and engaging with stakeholders:

- Identify and analyse stakeholders via stakeholder mapping (covered in Section 4 of this SEP);
- Develop a Plan to engage stakeholders in order to ensure effective communication about the Project (this SEP);

- Disclose information and ensure the necessary consultations as part of the E(S)IA process (see section 5 of this SEP);
- Ensure consultation and information disclosure continues throughout the life of the Project and continues beyond ESIA disclosure (as presented in section 6 of this SEP);
- Establish a grievance mechanism that is accessible and adequate to the local and project context (presented in section 6.4 of this SEP);
- Designate specific personnel as responsible for the implementation and monitoring of stakeholder engagement and grievance management activities (presented in section 8 of this SEP);
- Ensure the Project Company takes a lead role in ensuring adequate and meaningful stakeholder engagement and information disclosure takes place.
- Ensure the ESIA remains in the public domain for the life of the Project (e.g. online)[1].

3. PROJECT DESCRIPTION

This section provides a high-level overview of the Project, its location, and the environmental and socio-economic context. This section is based on the information provided by the Project Proponent available at the time of writing this SEP.

3.1 PROJECT LOCATION AND KEY COMPONENTS

The Project comprises an onshore Solar PV plant with a 105 MW (128 MWp) installed capacity. The production will be met through the installation of 218,805 PV modules. Projects' energy output will be used to power PDO facilities.

The Solar PV plant plot comprises 302 ha of leased land located on the south border of the Governorate of Al Dakhiliyah, specifically in the Wilayat of Adam, in the northern region of Oman.

The Project is situated in a flat desert with shrubs scattered around the area. The site is located within PDO's Block 6. The land plot is owned by the Oman State and leased to PDO via a Concession Agreement. Rights to use the land will be transferred to the Project Proponent via a usufruct agreement. The Project will not require any land outside the PDO leased areas, and will therefore not determine any relocation of households or other structures.

3.2 AREA OF INFLUENCE

The Area of Influence (AoI) for the Project is used to describe the boundaries of the extent to which Project impacts may extend or be experienced. The AoI can vary depending upon the type of impact being considered and the attributes of the potentially affected receptors and may also extend across administrative divisions. In each case, the AoI includes all areas within which potential impacts are likely to occur, taking into account the:

- Physical extent of the proposed works, defined by the limits of land to be acquired or used (temporarily or permanently) by the Project; and
- Nature of the baseline environment and manner in which impacts are likely to be propagated beyond the Project boundary which has not been fully defined yet due to

[1] It is noted that, should the Project seek international finance, it is common that the environmental and social impact assessment studies must be disclosed for a minimum of days (*e.g.,* 60, 120) before a project can be presented to the Board of Directors for an investment decision.

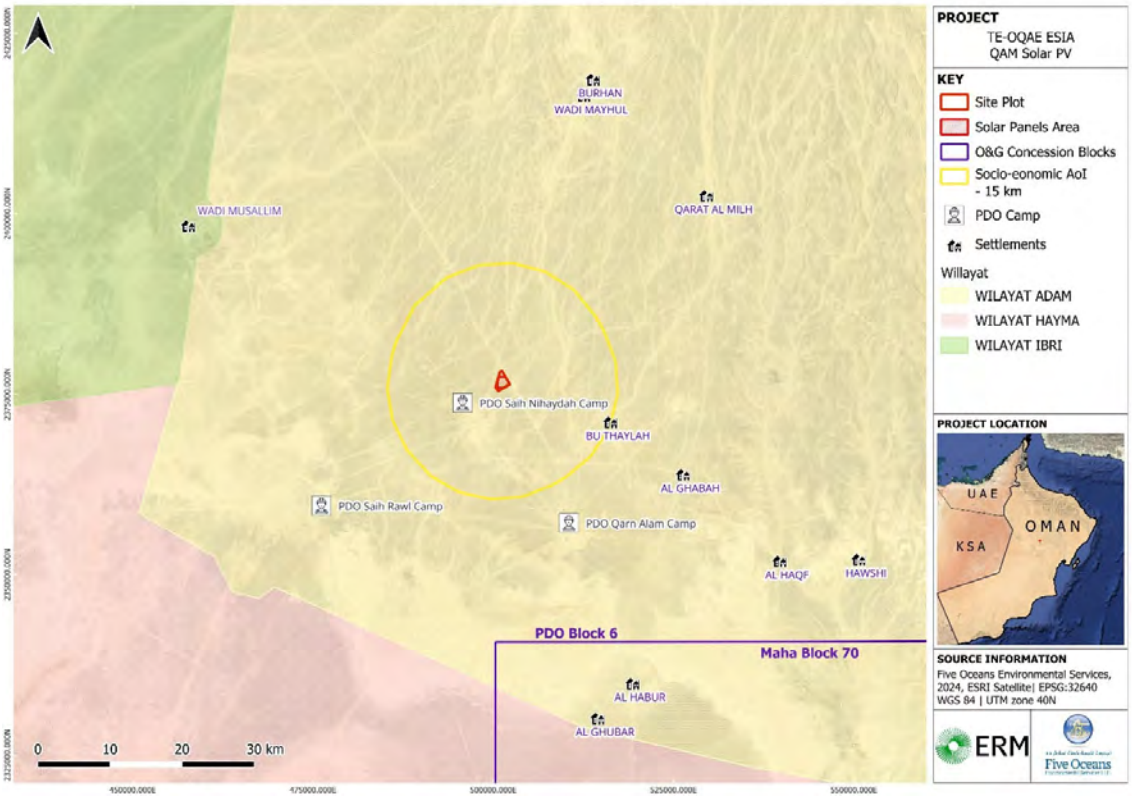
lack of information on the temporary construction facility locations such as campsites stations, deposits, mobilization areas, associate facilities, surplus material dumpsites, access roads, etc.

The AoI for the ESIA is based on the definition of the AoI provided by the IFC PS and is specifically:

- The footprint created by the core Project components;
- Areas potentially impacted by indirect, secondary, or induced effects, such as the transport corridor between the port and the Project, as well as areas potentially affected by the landscape and visual impacts of the Project;
- Areas potentially impacted by unplanned events such as accidents;
- Areas potentially impacted by cumulative effects associated with other known or reasonably predicted development (including other interactions with further expansion of this Project);
- Areas associated with facilities that rely entirely on the Project for their viability and existence (i.e., associated facilities).

A specific Social AoI has been identified for the Project, and it consists of a 15 km radius area around project facilities. The Project's location and respective AoI is shown in Figure 3.1

FIGURE 3.1 NORTH OMAN PV PROJECT LOCATION AND AREA OF INFLUENCE



Source: 5OES, 2024

The areas surrounding Project site are largely historic land use for oil and gas activities and there are no large settlements around, justifying why there are limited public utilities present in the Project vicinity.

The village of Abu Thaylah, a small settlement of around 14 houses and nine agricultural compounds is located at 14,9 km from the Project site. Table 3.1 presents the administrative jurisdiction of Abu Thaylah and its distance to the Project site.

TABLE 3.1 SETTLEMENTS WITHIN THE NORTH OMAN SOLAR AOI AND DISTANCE TO PROJECT SITE

Governorate	Wilayat	Settlement	Distance to Project site (km)
Ad Dakhiliyah	Adam	Abu Thaylah	14,9

Source: 5OES, 2024

Within the Project's social AoI, another significant category of human receptors is the accommodation camps that support PDO operations in the area. These camps, which house both PDO staff and contractors working on PDO projects, are referred to as 'camps' here. They include accommodation units, mess halls with catering facilities, site offices, and a clinic. While most of the workforce is present during the evening and night, a small number of staff are on-site throughout the day.

Saih Nihaydah (also spelled Sayh An Nuhaydah), located 4.9 km west of the Project site, contains several contractor camps for laborers working on the Saih Al Nihaydah gas field and associated facilities.

Additionally, Qarn Alam airport, situated approximately 11.4 km southeast of the Project site and within the Project's AoI, serves charter flights operated by Salam Air. These flights are exclusively for staff and contractors working in the Qarn Alam region, including Saih Nihaydah.

Social field work has been conducted as part of the ESIA development work at all locations listed, as presented in detail in Section 5.1.

3.3 PROJECT SCHEDULE

It is anticipated that the construction/commissioning phase of the Project will last between 18 months in total, estimated to start in Q4 2024. The final length of the program will be dependent on seasonal working and weather conditions. If weather has the potential to complicate construction activities, these complications will be minimized through the use of 'stop rules' if appropriate. Where possible, construction activities will be carried out concurrently (thus minimizing the overall length of the construction program).

The Project's operation lifetime with the Project Proponent will be of 18 years after which, the Project will be handed over to PDO in year 19, as part of the Project agreements, and it is expected to continue operating for a period thereafter.

3.3.1.1 ASSOCIATED FACILITIES

In accordance with international ESIA practice, the Area of Influence of a project includes not only the core project components but also any Associated Facilities related to the project.

Associated Facilities are defined by the IFC as "*…facilities that are not funded as part of the project and that would not have been constructed or expanded if the project did not exist and*

without which the project would not be viable". In the context of the Project, the relevant Associated Facilities per the above definition are considered to be:

- External site access road
- Interface yard (including AIS bay and OHL tower)

Connection to PDO's 132kV SNDC substation through an overhead transmission line (OHTL)

4. STAKEHOLDER IDENTIFICATION AND ANALYSIS

Stakeholders include individuals or groups that may influence or be impacted by the Project, described as follows:

> *A stakeholder is any person, group of persons, or organization on which the Project (or activity) has an actual or potential, direct or indirect, positive or negative impact, or one that has an actual or potential, direct or indirect, positive or negative impact on the Project*

4.1 STAKEHOLDER IDENTIFICATION

An initial stakeholder identification exercise has been conducted as part of developing this SEP, which resulted in a Stakeholder Register (attached in Appendix A of the SEP). Stakeholders identified to date meet one of the following criteria:

- have an interest in the Project;
- would potentially be impacted by the Project or have an influence on the Project (negatively or positively); or
- could provide commentary on issues and concerns related to the Project.

Stakeholders are presented in Table 4.1, including a description of their connection to the Project. This information is provided to consider the appropriate ways of providing information and consulting with the various groups. Stakeholders were categorised, based on their various needs, interests, and potential influence on the Project as outlined in Table 4.1, noting that this has been undertaken based on availability information and knowledge and has not been validated with the stakeholders themselves. See Appendix A for the complete register of Project Stakeholders.

The Stakeholder Register will be updated throughout the Project lifecycle, following the outcomes of engagements conducted.

TABLE 4.1 STAKEHOLDER CATEGORY LIST

Stakeholder Group		Role/Connection to the Project	Project Phase
Project affected parties			
Local community	Residents of Abu Thaylah	Lying within the social AoI, these stakeholders will require timely engagement prior to and during each project phase.	• All (with attention to consider pre-phase disclosures)
	Users of roads nearby	Shared road network and potential traffic related impacts	• Construction phase
	Camel and goat owners that potentially may use the site during raining seasons	Users of the project site and its surrounding areas for seasonal grazing and potential landscape changes	• Construction and operation phases
Local Government	Wali of Adam	The government's official representative of the Wilayah	• All (with attention to

Stakeholder Group		Role/Connection to the Project	Project Phase
		with connection with the local community	consider pre-phase disclosures)
Concession owner	Petroleum Development of Oman	Project Beneficiary	• All
Project workers	Project workers include those directly employed, as well as those employed by Project contractors	Project workers are key to the success of the Project. Their working conditions and labour rights are impacted by how the Project manages its workers and contractors.	• All
PDO personnel	PDO's personnel and contractors working and/or living within the AoI	• There are no permanent PDO personnel camps within the AoI (15 km). Personnel may occasionally enter the AoI to service the established wells and/or to drill new wells in the future. • Areas of interest/ impact may include disturbance due to traffic from construction activities and logistics from oversized loads (i.e., turbine blades) and HSE related risks and incidents.	• All
Other interested parties			
Institutional Environmental Authorities	Environment Authority	• Local environmental authority and regulator required to be engaged with throughout the Project lifecycle.	• All
Ministries	Ministry of Agriculture, Fisheries and Water Resources (MAF)	• Central Government Authorities (Ministries in Muscat and/or their Regional Offices) are of primary political importance to the Project in terms of establishing policy, granting permits or other approvals, and monitoring and enforcing compliance with Omani Law throughout all stages of the Project life-cycle. • These Ministries may hold relevant baseline data for the Project area.	• Current
	Ministry of Labour		
	Ministry of Transport, Communications and Information Technology		
	Ministry of Social Development		
	Ministry of Health		
	Ministry of Heritage and Tourism		
	Ministry of Education		
	Ministry of Housing and Urban Planning		
	Ministry of Justice and Legal Affairs		

Stakeholder Group		Role/Connection to the Project	Project Phase
	Directorate General (DG) offices of Ministries.		
	Civil Defense and Ambulance Authority (CDAA)		
Aviation Oversight Authority	Civil Aviation Authority (CAA)	The Civil Aviation Authority (CAA) is responsible for ensuring air transport safety and monitors aviation operations. A No Objection Certificate (NOC) has been obtained from CAA, in which the Project Proponent has committed to use anti-reflection panels.	• Current
Local level community representation	Majlis As Shura Adam	The people's representative of communities within the Wilayat	• All
	Municipal Council Adam	The people's representative in the Municipal Council for the Wilayat	
NGOs	Omani Women's Association Adam	An active community organization in the wilayat for the development of women in the Omani society under the supervision of the Ministry of Social Development	• All

Source: 5OES, 2024

5. STAKEHOLDER ENGAGEMENT ACTIVITIES CONDUCTED TO DATE

This Section provides a summary of the stakeholder engagement disclosure activities undertaken to date before and during the ESIA process.

5.1 ESIA BASELINE AND PROJECT DISCLOSURE

5.1.1 BASELINE AND DISCLOSURE APPROACH

Stakeholder engagement during the ESIA phase consisted of (i) briefing Project stakeholders on the details of the Project and the ESIA process, the associated timeline; (ii) consulting stakeholders of the Project on the potential impacts of the Project on their living conditions and their activities to collect their opinions, concerns, and suggestions; and (iii) collect primary socio-economic data to inform the ESIA.

Table 5.1 presents the locations where field work has been conducted to collect primary data through the settlement profiling, and to carry out the correspondent engagement with stakeholders through Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs), to collect their feedback and concerns. Engagement activities presented in were undertaken on 14 July 2024, through FGDs and KIIs with local Authorities and community representatives to

collect information and views of the key stakeholders. Interaction with PDO will take place to share the Stakeholder Engagement Plan, and engagement with PDO workers will be discussed with PDO representatives to ensure their feedback is also gathered.

The purpose of the meetings was to engage with key stakeholders and local community representatives to disclose the Projects at this stage, and collect feedback, especially about their concerns regarding the Project's potential impacts. In addition, where available, environmental and socio-economic data and information was sought.

Specifically, the types of engagement activities that have been conducted include the following:

- *Key Informant Interviews and Focus Group Discussions*:
    - KIIs were undertaken to collect governorate/Wilaya and community level information from National, District and local authorities specifically about population data, land use and other to inform the baseline.
    - FGD have been organized with Omani Women's Associations in both wilayat to collect information and informed opinions on key socio-economic aspects for the communities and to get additional general information on baseline conditions.
    - KII/ FGD have also addressed the presence and potential impacts on indigenous groups in the AoI of the Project. Following engagement, it was concluded that no groups that meet the criteria as defined by the IFC Performance Standard 7 are found in the area. Albeit their linguistic and cultural differences, all communities living in the Project area can be considered mainstream communities.
- *Ground truthing and Field Observations*: Field team visited key locations where KII and FGDs have been conducted.

For the ESIA, a total of two KII and one FGD were conducted in July 2024 (see Table for details.

TABLE 5.1 ESIA BASELINE SURVEYS AND PROJECT DISCLOSURE CONDUCTED

	Location/Venue	Stakeholders attending	Type of engagement (KII/FGD)	Date
1	Wali of Adam	Wali Deputy Wali Member of As Shura Council Member of Municipal Council Director of the Municipality Department in Adam Planning Specialist at the Wali's Office in Adam	KII	14.07.2024
2	Omani Women's Association of Adam	President of the OWA Deputy President of OWA Members	FGD	14.07.2024

Although the Sheik of Abu Thaylah was invited to attend the KKI on 14 July, he was unable to attend.

Section 5.1.2 presents an overview of the key issues and concerns expressed during the meetings.

More details of the stakeholders met during ESIA consultations is included in Appendix B, along with the Minutes of Meetings.

5.1.2 SUMMARY OF KEY ISSUES/ CONCERNS EXPRESSED DURING BASELINE AND DISCLOSURE CONSULTATIONS

This section presents a summary of the main issues and concerns raised by the stakeholders engaged with. Table 5.2 provides a summarized overview of the feedback from all engaged with during the baseline development and project disclosure consultations (conducted in July 2024).

Initial feedback from all stakeholders was overwhelmingly positive, recognizing the benefits these projects bring to the Petroleum Development Oman (PDO), the nation's leading exploration and production company with a 60 percent government interest.

While the potential impacts were noted, they did not lead to significantly in-depth discussions on any. Stakeholders referred to recent wind and solar projects in the region, reaching a consensus that there were no major impacts from these projects from their perspective.

The primary focus of discussions with stakeholders was the benefits of the projects. There is a general pre-existing expectation that oil and gas companies operating in the area should invest locally in various ways. However, it is acknowledged that oil and gas companies often have their own protocols, standards, and strategies for social investment, which may not always align with the community's desired level or means of socio-economic contribution.

Employment remains a national priority, with each Wilayah aiming to reduce the number of registered jobseekers. This expectation is an important consideration for all stakeholders involved.

TABLE 5.2 OVERVIEW OF FEEDBACK, CONCERNS AND QUESTIONS RAISED BY GOVERNORATE REPRESENTATIVES DURING BASELINE AND DISCLOSURE CONSULTATIONS

Subject	Ad Dakhiliyah
Project's perception	• Overall positive welcoming of the project • Query regarding location selection rationale and if the Project would meet PDO's energy requirements.
Local economy and livelihoods	• The primary sources of income include selling camels and private sector jobs in oil and gas companies operating in the area. • Employment rate amongst residents of the Wilayat is dependent on the opportunity/ role. Some residents have Master's and PhD qualifications. • Oil and gas companies use a centralized system for employment which does not enable prioritization for local employment
Community land uses (e.g., grazing, access rights)	• Residents of Abu Thaylah graze in the area of the Project site. However, the importance of the Project site as a grazing area could not be confirmed by those attending the stakeholder's meeting.

Subject	Ad Dakhiliyah
Community health, safety and development needs	• Dust and traffic related accidents, sometimes involving camels with suggestions to install road fencing.
Unique regional culture and heritage (e.g., language, traditions of local tribes, handicrafts)	• It was confirmed that the predominant tribe in Bu Thayla and Sayh An Nuhaydah is Al-Durai. • It was clarified that there are no archaeological sites in the area.
Environmental, Health and Social Impacts	• Query on the environmental impact and impact on nearby residents and their camels as well as expected benefits to the nearby settlements. • Anticipation of various benefits, including employment, provision of electricity and other contributions to the communities.
Project Social Investment and Responsibility	• Emphasis on the importance of focusing on social and economic returns/benefits to the Wilayah, with priority to locals and LCCs • Extending the project's output supply to serve the nearby settlements is suggested
Stakeholder Engagement	No Feedback received
Grievance mechanism	• Suggestion to involve members of the municipal council in the grievance mechanism.

The main outcomes of the consultation efforts in July 2024 are highlighted below:

- *Perception Towards the Project.* Consultation activities with the various stakeholders showed that their perception towards the project is positive. Despite this positive perception, many questions and concerns were raised during the consultation activities, which are summarized as follows:
    - Stakeholders informed about known road safety issues, specifically about the traffic accidents involving camels and Dust-related accidents, particularly on the road from Zahia Bridge to Wilayat Haima, requiring technical solutions.
- *Expectations from the Project*. The results of the consultation revealed the following expectations of the stakeholders:
    - Stakeholders are missing information that could shape their expectations from the project. For example, recruitment strategy for the project and social investment plan.
    - Emphasis on the importance of focusing on social and economic returns/benefits to the Wilayah, with priority to locals and LCCs.
- *Cooperate with the Project*. Field observations and the results of the consultation activities showed that the vast majority of stakeholders are cooperating with the Project, whether from government authorities and departments or local community.

The Minutes of the Meetings are included in **Appendix B**.

5.1.3 ESIA PHASE GRIEVANCE MECHANISM SHARED

For continued engagement, additional means were made available to stakeholders to provide feedback on the projects and related ESIAs included:

- Reporting grievance, query, or feedback to the Wali's office to pass on to the Project Proponent.
- Calling a local OQ phone number 00968 92120082 available during the entire ESIA disclosure period;
- Electronic communication, via email to OQ's Project email at NOS.Grievance@oq.com, during the entire ESIA disclosure period.

Anonymous feedback was also accepted.

6. STAKEHOLDER ENGAGEMENT PROGRAM

6.1 OVERVIEW

The SEP is designed to cover all phases of the Project, namely planning/design "permitting and preparation", construction, and operations/maintenance. This section outlines stakeholder engagement modalities during planning/design "permitting and preparation" and construction phases.

The contents will be updated according to the consultations that will be carried out during the various stages and activities of the Project.

The Project Proponent will carry out consultation and engagement activities according to the following objectives:

- Establish and maintain a strong, constructive and receptive relationship with Project stakeholders;
- Disseminate information and conduct engagement activities in a transparent, respectful and culturally appropriate manner for all stakeholders;
- Carry out engagement activities adapted to the context in which they take place, so as not to exclude any stakeholder due to language, level of education and technological barriers; and
- Ensure that specific measures are taken to integrate vulnerable groups and groups potentially excluded from other engagement activities, including specific measures to engage with stakeholders affected by Project land-take in order to verify and assess their ability to adapt to the restriction on accessing grazing areas affected by the Project (this could include placing a notice at the Wali office).

Specific planning and engagement activities will be necessary at each Project phase; however, some activities will be ongoing throughout the entire Project cycle and therefore common to the different phases. Common activities include the following:

Regular update and revision of the stakeholder register including stakeholder analysis and re-evaluation as necessary throughout the different Project phases.

- Addressing comments, questions, and grievances regularly and through appropriate channels, and issuing information to stakeholders. This includes regular refreshers to stakeholders about the Grievance Mechanism and related processes.
- Regular information reporting to the different stakeholders as appropriate.
- Regular internal and external Project monitoring reports (in particular during Construction and Operations).

Engagement is an ongoing process of sharing information, understanding stakeholder issues, and responding to questions and concerns.

6.2 PHASE 0: PERMITTING & PREPARATION

To support the development of the Project social and environmental baseline, engagement involved gathering primary and secondary data from stakeholders. These engagements also included the disclosure of the Projects' information, potential impacts, grievance mechanism

and ground proofing of data held by the consultant team. These engagements were discussed in Section 5 of this plan.

Additionally, during the Permitting and Preparation phase (Phase 0), the following stakeholder engagement activities are proposed as part of ESIA process, these involve the following:

- recommendation to appoint a Community Liaison Officer (CLO),
- the disclosure of the ESIA report,
- further engagement after the disclosure with any significant updates and changes in the Project, if any.

The implementation of the engagement activities proposed below will serve to ensure an effective engagement process going forward.

6.2.1 APPOINTMENT OF A COMMUNITY LIAISON OFFICER (CLO)

The Project will appoint a CLO to serve as interface between the Project and local stakeholders, including communities.

The CLO's role and responsibilities will include oversight of day-to-day community and stakeholder engagement activities and responsibility for interfacing between the stakeholders and the Project including its Contractors.

Final modalities for the appointment, line of reporting and role of the CLO following the permitting phase and based on the recommendation of the ESIA will be defined by the Project.

This person should be a neutral individual, ideally recruited from the local community, who speaks the dominant local languages, English and Arabic, and should be proven not to have a vested interest in a particular outcome.

This person will need to be acquainted with the stakeholders and stakeholder process as outlined in this SEP, including a clear understanding of the Project schedule and engagement milestones in order to inform stakeholders appropriately about the development of the Project. The CLO will have direct contact with PDO and coordinate liaison activities. The EPC Contractor will also recruit a CLO.

The CLO will need to consider the grievance mechanism gender dynamics in the communication channels and to ensure that women and vulnerable groups are properly engaged and have a suitable recourse to voice complaints.

Details on the responsibilities of the Project Proponent and EPC Contractor CLO are provided below.

6.2.2 PLANNED ENGAGEMENT DURING THE ESIA DISCLOSURE PROCESS

The last stage of the ESIA process is "Disclosure", which consists of publicly disclosing a draft version of the complete impact assessment, i.e. the Final Draft ESIA Report. The Final Draft ESIA report and supplementing documents ("ESIA package"), including the Non-Technical Summary (NTS) and ESMP, will be made widely available to the public for comment via the Project website and hard copies available (at least the summaries in case of large documents) for inspection at a number of specified locations.

Two Public Consultation and Disclosure events will be organized by the ESIA consultant in close cooperation with TTE and OQAE and other key relevant organizations. The main objective of

the Public Consultation is to engage local key stakeholders and involve them in the revision of the draft findings of the ESIA including the study of the various alternatives. Public Consultation sessions are a key requirement for the IFC as part of the Disclosure and Information Sharing Policy. It is also a key condition stipulated by law under the Omani guidelines for the preparation of EIA.

This process permits meaningful consultations between the Project Proponent and project-affected groups. Before the public consultation on the draft EIA, the draft technical summary in Arabic should be disclosed to all concerned parties. It is recommended that the English and Arabic versions of the ESIA Package be available on the Project website. These meetings will be suitably advertised and interested individuals and organisations will be invited to hear about the Project, review information, talk to members of the Project and the ESIA teams and provide comments on the Project and its impacts.

All comments, questions and other input from the public will be logged and then considered by both the Project and the ESIA teams. Where feasible and relevant, changes will be made in the Project planning/design/ implementation to address concerns raised. These changes will be reflected in revisions to the Project as appropriate, and the revised final ESIA Report. In addition, a brief summary of the key comments received during disclosure and how these comments are reflected/will be reflected in the Project design and the final ESIA Report will be included in this SEP.

6.3 POST ESIA STAKEHOLDER ENGAGEMENT

After the ESIA Phase, the Project Proponent will be in charge of stakeholder engagement through the construction, operation and closure phases of the Project.

6.3.1.1 ENGAGEMENT FOR ENVIRONMENTAL AND SOCIAL MANAGEMENT PLANS DEVELOPMENT

After obtaining the environmental permit from the EA, the environmental and social management plans, prepared as part of the Project's Environmental and Social Management System (ESMS) and described in the Environmental and Social Management Plan (ESMP), will have to be prepared. It is expected that additional engagement and consultation will be required to inform the development of the management plans.

Of particular importance will be the engagement to inform the development of the Project Proponent's in-country value strategy and plan and the Omanization Management Plan, as government and stakeholder expectations in this regard are high.

Furthermore, engagement with other developers in the vicinity to address shared concerns should be planned to be conducted throughout all Project phases, ensuring that cumulative impacts are discussed during these engagements. Where cumulative impacts are clearly identified, a Cumulative Impact Strategy should be developed, since cumulative impacts cannot be managed at a single Project level.

6.3.1.2 RE-ENGAGEMENT

Stakeholder engagement activities will have taken place during the ESIA process to consult relevant stakeholders at all levels and collect their feedback. Some follow-up engagement activities are also planned post-ESIA.

To formalise these engagements, within the SEP framework, and to ensure that all stakeholders have the same understanding, a round of engagement meetings will be undertaken prior to the start of the Phase 1 activities. This will include the following:

Formal engagements with PDO, EA, ROP, national service providers, Walis, community representatives] (as necessary) to present the Project SEP and planned engagement activities over the coming phases of the Project as well as updated Project information.
Community meeting(s) with representatives of communities in the AoI convened at an accessible location.

The agenda of the re-engagement meetings shall include a Project update and information disclosure, using a presentation. This will cover:

- Updated Project information including the Project schedule and activities.
- The roles and responsibilities of the Project Proponent's CLO and the EPC CLO regarding engagements on the Project.
- Present the updated Project Stakeholder Engagement Plan.
- Continued dissemination of the Project Grievance Mechanism.

As with all engagement activities, these refresher engagement meetings shall be used as an opportunity to identify and register any new stakeholders and to gather and register stakeholder feedback, issues and concerns as well as feedback about the effectiveness of the Project Grievance Mechanism.

6.3.1.3 DISCLOSURE OF PROJECT INFORMATION AND FEEDBACK COLLECTION

The NTS developed for the draft and ESIA disclosure meetings will be regularly updated to include additional information on Project development activities and shared with stakeholders during engagement activities.

The Project will also take advantage of engagement activities to collect comments, questions and grievances regularly through the grievance mechanism and directly through the Project Proponent's CLO and the EPC CLO.

Following disclosure of the ESIA, stakeholder engagement will continue to be carried out by the Project Proponent for the Project in line with the SEP, which will be updated at least biannually (every 6 months) through construction and annually during operations, or more frequently, as required, based on stakeholder feedback and changes to Project planning. The Project Proponent's CLO will carry out updates to the SEP, with the following intent:

- To make sure stakeholder lists and mapping remains relevant and accurate;
- To review and amend, if necessary, information dissemination and engagement practices in order to continue to meet the needs of stakeholders;
- To review and assess stakeholder participation in order to revise, if necessary, the frequency, means and format of engagement to meet accessibility and participation requirements of all stakeholders.

The EPC Contractor / Project Proponent is responsible for planning/design and construction. Therefore, contractors together with the Project Proponent are responsible for stakeholder engagement during these phases of the Project. For the operation phase, all engagement

activities during Project operations will be implemented and managed by the Project Proponent.

Table 6.2 below presents the proposed stakeholder engagement approach for the construction and operation phases.

Throughout the Project lifecycle, the consultation and engagement process should bring into consideration the existence of vulnerable groups. Ensuring that these groups are adequately considered in the engagement activities and that their views and concerns are taken into account during the engagement process is critical to ensure these are not further victimised and they are able to benefit from Project opportunities. Table 6.1 provides a list of different strategies to capture vulnerable groups' views throughout the Project.

TABLE 6.1 STRATEGIES TO CAPTURE VULNERABLE GROUPS' VIEWS

Groups	Description
Illiterate groups	Information to be disseminated by community representatives or other means through culturally appropriate methodologies (radio, verbal public announcements, face to face information sharing etc.).
People with disabilities	If disabled people are present in the Area of Influence (AoI), a dedicated outreach program will be developed to engage this group specifically regarding the project's negative and positive impacts, such as land use and employment opportunities. This program will include face-to-face meetings.
Women (including women headed households) and girls	Female Community Liaison Officers (CLOs) will establish robust systems of communication with women and girls in the community and provide safe spaces to voice concerns. This will be done through consultations and focus groups with women and girls or whatever necessary taking into consideration also the high literacy rates in particular in rural areas. Individual interviews will be held if needed. The Grievance mechanism will provide a specific channel for investigation and resolution of grievances, including anonymous grievances and psychosocial counselling.
Elderly	Project information will be disseminated in the Arabic language and public consultation meetings will ensure appropriate language for targeted audience. Information will be disseminated by community representatives or other means through culturally appropriate methodologies (radio, verbal public announcements, face to face information sharing etc.).
Economically disadvantaged households	A specific engagement, in coordination with the Wali's office and the Ministry of Social Development, will be conducted to ensure these households get access to potential labour opportunities which might arise.

Post-ESIA engagement by the Community Liaison Officer appointed by the Project with the sheikh of Abu Thaylah to present the Project and its' impact on grazing access, and to verify and assess the ability of owners of livestock to adapt to the restricted access to grazing areas taken by the Project. In the event that some livestock owners are not adaptable to the restriction, any necessary measures to counteract this will be developed in consultation with the sheikh, PDO, and the Wali's office.

TABLE 6.2 STAKEHOLDER ENGAGEMENT APPROACH DURING CONSTRUCTION AND OPERATION

Stakeholder		Communication Method(s)	Information to be Disclosed	Objective	Language	Timeframe	Responsibility
Project affected parties							
Potential Affected Communities	▪ PDO personnel & contractors ▪ Sheikh of Abu Thaylah	▪ Letters via the Wali's Office ▪ Community Liaison Officer (CLO)	▪ General project description ▪ Licenses and permits, including ESIA approval ▪ Establishment of Grievance Mechanism	▪ Update stakeholders on Project progress ▪ Address any grievances ▪ Renew licenses and permits as required. ▪ Sustain peaceful working relationship with stakeholders	▪ Arabic	▪ Pre-construction ▪ Construction ▪ Commissioning ▪ Operational ▪ Decommissioning	▪ Proponent team; ▪ EPC contractor; ▪ Post ESIA consultant (to be determine)
Other interested parties							
Environmental Sector	▪ Environment Authority	▪ Letters ▪ Email	▪ General project description ▪ ESIA Approval, Licenses and Permits	▪ Update on Project progress ▪ Renew licenses and permits as required. ▪ Sustain peaceful working relationship with stakeholders	▪ Arabic ▪ English	▪ Pre-construction ▪ Construction ▪ Commissioning ▪ Operational ▪ Decommissioning ▪	▪ Proponent team ▪ EPC contractor ▪ Post ESIA consultant (to be determined)
Line ministries	▪ Ministry of Labour	▪ Letters	▪ General project description	▪ Understand regulatory	▪ Arabic	▪ Pre-construction	▪ Proponent team

Stakeholder		Communication Method(s)	Information to be Disclosed	Objective	Language	Timeframe	Responsibility
	▪ Ministry of Transport and Communications ▪ Ministry of Social Development (MoSD) ▪ Ministry of Agriculture and Fisheries (MAF) ▪ Ministry of Health ▪ Ministry of Water Resources (MRWMR) ▪ Ministry of Culture and Heritage ▪ Ministry of Education ▪ Ministry of Housing ▪ Ministry of Justice and Legal Affairs	▪ Email ▪	▪	requirements applicable to the Project.	▪ English		▪ EPC contractor ▪ Post ESIA consultant (to be determined)

Stakeholder		Communication Method(s)	Information to be Disclosed	Objective	Language	Timeframe	Responsibility
	▪ Directorate General (DG) offices of Ministries. ▪ Civil Defense and Ambulance Authority (CDAA)						
Aviation oversight Authority	▪ Civil Aviation Authority (CAA)	▪ Letter	▪ Project description	▪ Obtain No Objection Certificate	▪ Arabic / English	▪ Pre-construction ▪	▪ Proponent team ▪
Local Governmental Entities	▪ Wali of Adam ▪ Head of Municipality, Adam ▪ Majlis Ashura representative from Adam ▪ Member of Adam Municipal Council	▪ Letters via the Wali's Office ▪ Community Liaison Officer (CLO)	▪ General project description ▪ Licenses and permits, including ESIA approval ▪ Establishment of Grievance Mechanism	▪ Update stakeholders on Project progress ▪ Address any grievances ▪ Renew licenses and permits as required. ▪ Sustain peaceful working relationship with stakeholders	▪ Arabic	▪ Pre-construction ▪ Construction ▪ Commissioning ▪ Operational ▪ Decommissioning	▪ Proponent team ▪ EPC contractor ▪ Post ESIA consultant (to be determine)
Contractors/ suppliers Workers	▪ To be determined	▪ Codes, standards, procedures applicable to the Project, induction and	▪ Project standards, requirements and grievance mechanism.	▪ Set expectations for environmental and social management and	▪ Arabic, English and other languages	▪ Construction - Commissioning - Operational ▪ Decommissioning	▪ Proponent team ▪ EPC contractor

Stakeholder		Communication Method(s)	Information to be Disclosed	Objective	Language	Timeframe	Responsibility
		refresher training.		communicate grievance procedure	depending on country of origin		
Project lenders	▪ To be determined	▪ Email	▪ ESIA ▪ Stakeholder Engagement Plan ▪ Any other information that may be requested.	▪ Understand their environmental and social standards and apply them to the project design, development and implementation.	▪ English	▪ Pre-construction ▪ Construction ▪ Commissioning ▪ Operational ▪ Decommissioning	▪ Proponent team
Service Providers/ Local Business Owners	▪ To be determined	▪ Codes, standards, procedures applicable to the Project, induction and refresher training.,	▪ Project standards, requirements and grievance mechanism.	▪ Set expectations for environmental and social management and communicate grievance procedure	▪ Arabic / English	▪ Construction ▪ Commissioning ▪ Operational ▪ Decommissioning	▪ EPC contractor ▪
Civil Society	▪ Omani Women's Association Adam	▪ Letters via the Wali's Office ▪ Community Liaison Officer (CLO)	▪ General project description ▪ Licenses and permits, including ESIA approval	▪ Update stakeholders on Project progress ▪ Address any grievances ▪ Renew licenses and permits as required.	▪ Arabic	▪ Pre-construction ▪ Construction ▪ Commissioning ▪ Operational ▪ Decommissioning	▪ Proponent team; ▪ EPC contractor; ▪ Post ESIA consultant (to be determined)

Stakeholder		Communication Method(s)	Information to be Disclosed	Objective	Language	Timeframe	Responsibility
			▪ Establishment of Grievance Mechanism	▪ Sustain peaceful working relationship with stakeholders			
Media	▪ Local media ▪ Online journalism ▪ TV	▪ Company's Website ▪ Newspapers ▪ Letters ▪ Email	▪ Project aim, schedule, and milestones.	▪ Influence local stakeholders' perceptions of the Project.	▪ Arabic and English	▪ Pre-construction ▪ Construction ▪ Commissioning ▪ Operational ▪ Decommissioning	▪ Proponent team; ▪ Post ESIA consultant (to be determined)

6.4 PHASE 1: SITE PREPARATION, CONSTRUCTION, PRE-COMMISSIONING AND COMMISSIONING

6.4.1 SITE PRESENCE AND REGULAR ENGAGEMENT WITH STAKEHOLDERS

To ensure that the Project is accessible to all stakeholders, the EPC Contractor will have offices within the Project site. Project Proponent's CLO and the EPC CLO will be based on site, at an accessible location. Public notice board will also be displayed (if and where possible) at agreed locations for example in the settlements of Abu Thaylah and Al Ghabah, to guide any interested or affected parties who need more information or want to submit grievances.

The CLO will be responsible for implementing regular proactive and structured engagement with affected stakeholders throughout Phase 1.

Engagement during Phase 1 will be conducted at regular intervals, which will be defined based on the level of concerns and expectations of stakeholders. It will be focused on informing and updating stakeholders most notably community members about the Project site preparation, construction, pre-commissioning and commissioning activities and schedule. The regularity and the approach to the engagement proposed below will seek alignment with PDO (who also carries out regular engagement with stakeholders for other purposes).

The engagement shall include:

- Face-to-face information dissemination, consultation, and coordination meetings with local leadership and other key authorities.
- Focus Group Discussions for vulnerable and special interest groups with particular concerns such as camel and goat owners, or community members using or crossing the AoI.
- Face-to-face coordination meetings with relevant stakeholders in the area to manage construction impacts, in particular from road transportation and approaches to local employment.

Information dissemination tools in addition to the public notice boards (*e.g.,* flyers) will continue to be used to support the above activities.

6.4.2 MONITOR CONTRACTORS

The contractors shall be required to support and participate, as relevant, in the implementation of the Project SEP throughout their contract period. The Project Proponent will take the lead on stakeholder engagement and relationship management throughout the Project lifecycle to ensure that social risks are appropriately managed.

However, Project Proponent's CLO will liaise with and coordinate with the EPC CLO and EPC staff to ensure that any interaction taking place between contractor workforce and stakeholders is consistent with the standards, core principles and procedures for undertaking, recording and documenting stakeholder engagements, as is outlined in this SEP. The Project Proponent's CLO and EPC CLO responsibilities are described in more detail in the following Sections of this plan.

6.4.3 MAINTAIN STAKEHOLDER REGISTER

The Project Proponent shall update and revise the stakeholder register regularly and ensure that stakeholder analysis and mapping is assessed and re-evaluated as necessary based on information revealed through interactions, engagement activities and grievance management.

Any new stakeholders in the Project AoI or stakeholders that develop an interest in or are potentially impacted by the Project due to unforeseen events shall be identified and analyzed and strategies will be developed for engaging them. The CLO will be responsible for providing to the Project Proponent's Project HSE Manager any feedback or information on new stakeholders or changing stakeholder issues/risks which arise through their stakeholder interactions.

6.4.4 MAINTAIN GRIEVANCE PROCEDURE

The CLO shall provide regular refreshers to stakeholders about the Grievance Mechanism and shall respond quickly and effectively to grievances raised in line with Project Proponent's set procedures and guidelines, and through regular engagement activities try and anticipate where stakeholder issues or concerns may arise.

The CLO will also be responsible for identifying, logging, and responding to all grievances or reporting and escalating more complex issues to management as appropriate. The Project's procedure for tracking and responding to stakeholder grievances is described in Section 7. Close coordination with Project Proponent regarding grievance management will be required as appropriate.

6.4.5 ENGAGEMENTS RELATED TO TRANSITION TO OPERATIONS

It is anticipated that there will be contract termination of a number of Project staff by the various Project contractors. Prior to the conclusion of the construction phase and the start of operations, the ESMS will be revised along with the SEP, which will be updated in order to manage the transition and ensure consistent and systematic information to all potentially affected persons on the impending changes. The agreed messages will be disseminated through the CLO to the stakeholders, in particular the potentially affected ones, if any. The communications with potentially affected stakeholders should be carried out early during the Phase 1 to allay fears and uncertainty regarding the potentially affected stakeholders' contract termination.

6.5 PHASE 2: OPERATIONS AND MAINTENANCE

The operations phase will have significantly reduced staffing numbers and anticipated to have reduced stakeholder issues. However, stakeholder engagement will still be conducted with the relevant Project stakeholders.

The following will be undertaken in this phase:

6.5.1 CONFIRMED STAKEHOLDER ENGAGEMENT MANAGEMENT

Typically, the operations phase will have less Project activities which result in significant impacts on the community and other stakeholders.

However, there is still a need to retain the stakeholder engagement program for continuity of engagement with the specific stakeholders who may be potentially affected during this phase

as well as with other relevant stakeholders through continuous regular engagement and through specific engagements related to the transition from construction to operations.

6.5.2 CONTINUOUS REGULAR ENGAGEMENT

Engagements shall be continually undertaken during the operations phase. Regular direct engagements with the relevant stakeholders and, where required, Focus Group Discussions around specific issues or concerns will be the main engagement activities between the CLO and the potentially affected stakeholders.

These engagements will be aimed primarily at maintaining continuity of relationships, monitoring the effects of Project impacts on stakeholders and demonstrating a long-term organisational commitment to delivering on social and environmental mitigations or to resolving outstanding issues and grievances. Of high importance will be the engagement in relation to delivery of benefits to the community though implementation of social investment initiatives as well as engagement with the Omani Trade Unions and/or worker representatives.

The timings of these engagements will be determined by the Project Proponent's HSES Manager or the nominated manager and Project Proponent's Project Manager, observing the nature and scale of operations at any given time.

6.5.3 MAINTAIN STAKEHOLDER REGISTER & MAINTAIN GRIEVANCE PROCEDURE

The CLO will keep, update and revise the register as often as necessary during the Project's operations. The CLO will also ensure that the grievance management measures provided in the Grievance Mechanism are adhered to in this phase.

6.6 PHASE 3: REPOWERING OR DECOMMISSIONING

Repowering or decommissioning is not part of the Project Proponent's scope. The solar farm is planned to be handed over to the Off-taker (PDO) in year 19 of the operational lifetime of the Project as part of the Project agreements. Therefore, PDO will be responsible for this phase.

Should decommissioning be the preferred option following the infrastructure assessment, this will result in contract termination of Operations and Maintenance staff (around ten full-time employees) and a number of activities to remove Project infrastructure and rehabilitate the site / prepare it for future use. In this case, stakeholders will need to be informed about these activities in advance and throughout the decommissioning process. The SEP will need to be updated to address these changes but will include the following:

- Revisit the stakeholder identification and analysis in light of the proposed decommissioning approach.
- Communicate with affected stakeholders early to allay fears and uncertainty regarding the decommissioning process.
- Communicate with stakeholder on the exit strategy planned in particular on social aspects (i.e. Grievances, rehabilitation, socio-economic projects, employment, etc.).
- Provide regular updates and progress reports to stakeholders.
- Consult with all affected stakeholders on transfer and management of assets and liabilities.

Manage grievances through the formal grievance mechanism and ensure no pending grievance is left.

6.7 ENGAGEMENT TOOLS

To achieve a consistent and effective stakeholder engagement programme, standardised tools need to be developed and reviewed by Project management for use in the engagements.

The tools outlined in table below will be key to stakeholder engagement in all phases of the Project, and the contents and messages shall be reviewed and approved prior to dissemination.

Tool	Description
NTS	A Non-Technical Summary (NTS) will be developed in Arabic and English and distributed during the engagement activities. The NTS will provide a description of the proposed Project, the Project schedule the engagement programme and schedule, contact details for the CLO (Project Proponent's CLO and EPC Contractor CLO) and information on the grievance mechanism. As the Project progresses, this document will be reviewed and updated as often as necessary to ensure accuracy of information at any given time.
Notice Board	Notice boards will be erected at agreed locations (if and where possible), accessible to the communities, and updated on a regular basis. The notice board will serve as an information dissemination tool. For example, the Project will be able to display updates on the Project's progress, designated community liaison officer contact details, information on the grievance mechanism and recruitment updates if relevant. Project information should be available in Arabic and English as well as other languages of expat workers (i.e., Hindi, Urdu etc.). Wherever possible, maps or visual aids will be used to increase accessibility of the notices.
Focus Groups Discussions (FGD)	In an FGD, a semi- structured approach is used to conduct engagements with different stakeholder groups for example men and elders, and women with specific issues of concern. The questions explored and discussed can follow specific themes for example labour related issues, livelihoods, etc.
Stakeholder Register	The CLO will maintain a stakeholder register to update the list of Project stakeholders identified and their contact details. The stakeholder register developed is presented in **Appendix A.**
Stakeholder Analysis and Mapping	The CLO will maintain the Stakeholder mapping tool and re-evaluate it as necessary based on information revealed through interactions, engagement activities and grievance management throughout the Project lifecycle. The CLO will coordinate a session at least once per year to map the Project's stakeholders by level of influence and level of interest. All departments will be involved in this exercise to obtain the Project Stakeholder mapping.

Tool	Description
Stakeholder Engagement Log	The CLO will maintain a stakeholder engagement log to plan and track engagements related to the different ESMS Management Plans. An example template for development of such tool is presented in **Appendix B**.
Grievance Communication Form and Database	The CLO will maintain a stakeholder grievance database to record and track grievances as well as resolution status. A grievance communication form template is presented in **Appendix C**.

Source: ERM, 2024

7. GRIEVANCE MECHANISM MANAGEMENT PROCESS

7.1 DEFINITIONS

The IFC's Good Practice Guide to addressing grievances from Project-affected communities describes a grievance as:

'…A concern or complaint raised by an individual or a group within communities affected by company operations. Both concerns and complaints can result from either real or perceived impacts of a company's operations, and may be filed in the same manner and handled with the same procedure.'

It describes a Project-level grievance mechanism for affected communities as:

'…A process for receiving, evaluating, and addressing project-related grievances from affected communities at the level of the company, or project.'

7.2 PURPOSE OF THE GRIEVANCE MECHANISM

The Grievance Mechanism (GM) presented in this section covers all grievances against the Project.

The objective of a grievance mechanism procedure is to ensure that all comments and complaints from any project stakeholder are considered and addressed in an appropriate and timely manner.

Both the Project Proponent and contractors must be committed to avoiding, reducing, limiting and, if necessary, remedying any adverse impacts caused by their activities on local populations and on their social and physical environment. One of the tools for identifying, preventing and managing unanticipated impacts is a GM.

The grievance mechanism will deal with suggestions, concerns, and grievances related to any issues arising from Project specific activities. The grievance mechanism is not designed to obstruct access to other judicial or administrative processes that are available under Omani law.

Grievances are complaints or comments (or questions/suggestions) related to the way a project is being carried out. A mechanism for resolving these grievances constitutes a permanently open official channel, through which stakeholders can exchange with the promoter and its service providers, while the follow-up of grievances warns of the existence of conflicts or disputes in progress. exacerbation. The establishment of such a mechanism is required under the EP IV and IFC PS.

Identifying and resolving grievances builds positive relationships between the project developer, communities and other stakeholders. For effective management, the components listed in the box below should be integrated. The structure of the Grievance Mechanism developed for the Project follows the recommendations of good practices in force.

This section presents the GM to be implemented by the Project Proponent to manage external grievances in relation to the proposed projects, particularly from affected communities. This section also responds to the requirement to develop and implement a worker grievance mechanism as required by IFC PS 2 *Labour and Working Conditions.*

The IFC's Good Practice Guide on Addressing Grievances from Project-affected Communities (2009) describes a grievance as:

"A concern or complaint raised by an individual or a group within communities affected by company operations. Both concerns and complaints can result from either real or perceived impacts of a company's operations, and may be filed in the same manner and handled with the same procedure".

It describes a project-level grievance mechanism for affected communities as:

"A process for receiving, evaluating, and addressing project-related grievances from affected communities at the level of the company, or project" (IFC, 2009).

As the IFC highlights, "combined with effective community engagement, a transparent and legitimate grievance mechanism that is a joint effort between the company and communities can increase trust and improve communication" (IFC, 2009).

IFC PS2: *Labour and Working Conditions* addresses Grievance Mechanism for workers and set the following conditions:

The client will provide an effective grievance mechanism for workers (and their organizations, where they exist) to raise workplace concerns. The client will inform the workers of the grievance mechanism at the time of hiring, and make it easily accessible to them. The mechanism should involve an appropriate level of management and address concerns promptly, using an understandable and transparent process that provides timely feedback to those concerned, without any retribution. The mechanism should also allow for confidential complaints to be raised and addressed. The mechanism should not impede access to other judicial or administrative remedies that might be available under law or through existing arbitration or mediation procedures, nor should it substitute for grievance mechanisms provided through workers' unions or collective agreements.

Grievances may take the form of specific complaints for damages/injury, concerns about routine Project activities, or perceived incidents or impacts. Grievances may also be related to a commitment of the Project Proponent, the developer or its subcontractors that has not been honoured. The Project Proponent recognizes that unforeseen impacts may occur. Therefore, the maintenance of an open line of communication with the communities and/or those potentially affected by the Project is important to maintain transparent relations and build trust.

7.3 PRINCIPLES UNDERPINNING THE GRIEVANCE MECHANISM

The core principles underpinning the GM are the following:

- Ensure *a prompt, consistent and respectful mechanism* for receiving, investigating and responding to concerns and complaints from individuals and community stakeholders, ensuring their effective and timely resolution;
- Be *culturally appropriate* and take into account local, cultural, linguistic and physical context, without restriction or discrimination to any stakeholder who consider themselves affected;

- Be *accessible*, *open and receptive*, providing multiple access points for receiving all types of grievances and easing the process for stakeholders;
- Be *well publicized and understood*, ensuring all stakeholders are aware of the CGM, including the process, the roles and responsibilities of everyone involved;
- Be *transparent and confidential*, while protecting privacy and handling personal data and sensitive information in accordance with applicable standards and laws;
- *Not impede access to judicial* or administrative remedies;
- *Bear no cost and no retribution;*
- Be *free from manipulation, intimidation and retaliation*; and
    - Provide a source of learning to contribute to improvement in the Environmental and Social performance of the Project.

The GM applies to all activities and components of the proposed Project, including all contractors and subcontractors under the Project Proponent's responsibility. It is applicable to all phases of the Project, including construction and operation, and will be updated regularly to ensure it remains relevant and appropriate to the scale and phase of the Project.

The process to identify and respond to Gender-Based Violence and Harassment (GBVH) grievances will align with the guidance "Addressing Gender-Based Violence and Harassment" (IFC/ EBRD/ CDC Group, 2020), particularly Annex 7: GBVH grievance mechanisms and investigative procedures. This refers to:

- Designing reporting channels which are suited to the company's GBVH risks and groups, including communities and service users;
- Designing accessible and culturally appropriate ways to report, for example in the local language, taking cultural sensitivities into account;
- Include information for survivors about support services and safety measures available to be accessed;
- Allow for anonymous reporting and protect confidentiality at all stages of the process.

The Project Proponent will require all contractors and sub-contractors to put in place their own worker grievance mechanism and to make it accessible to all workers, whether permanent or temporary, directly or indirectly employed. Likewise, the EPC Contractor will be required put in place their own community grievance mechanism prior to commencement of the construction phase and to make it accessible to communities.

Furthermore, the Project Proponent will establish and maintain a grievance mechanism aligned with the UNGP's effectiveness criteria which will be accessible to all projects' workforce — including contractor and subcontractor workers— and members of the local communities. The mechanism will be adapted to the Projects' construction phase, with contractor and sub-contractor staff well-versed in third-party grievance resolution. Information about this mechanism will be shared amongst local communities.

The Project Proponent will inform the stakeholders about the GM in the course of its engagement activities, and report regularly to the public on its implementation, protecting the privacy of affected individuals.

7.3.1 RESPONSIBILITY FOR GRIEVANCES MANAGEMENT

Role	Responsibility
Project Proponent General Manager	• Approves and signs the Grievance procedure and is accountable for Grievance Management. • Ensures the Company gets the resources (human and financial) to manage efficiently grievances. • Gives the final approval of any resolution offered to a complainant.
Social performance/Compliance officer of TTE affiliate in Oman/OQ AE	• Responsible for the Grievance Management procedure, including updating of the procedure based on lessons learned. • Ensures remedies to grievances are compatible with international Human Rights standards. If necessary, seek for support for Human Rights external expertise. • Maintaining documentation of grievances and the handling of them. Prepares yearly reports with an analysis of KPI.
Project HSE Manager	• Ensures high level coordination between the Project Proponent and the contractor in the management of grievances. • Supports the CLO and the GA or any person overseen the process in the resolution process, especially the investigation when the grievance is directly related to operational activities. • Receives complaints from recipients, ensures complaints have been acknowledged and that a response is provided to the complainant in a timely and fair manner. • Ensures the implementation of the solution is carried out fairly and timely. • Promotes awareness and understanding of the existence and purpose of the Grievance Management procedure within the workforce, for them to know what to do in case they become recipients of a complaint.
Recipient (any employee, incl. Contractors)	• Must be aware and understand the Grievance Management procedure. • Refers complaints to the Project HSE Manager.
Grievance management committee (Project HSE Manager, CLO, and GA)	• Responsible for conducting investigations of a complaint, proposing resolutions and implementing corrective actions. • Regularly reviews the grievances and their causes to identify changes to be brought to operating procedures and contractors' practices. • Approves the solutions to be presented to the complainant.
Community Liaison Officer	• Is the main point of contact between stakeholders and the Project. • Ensure stakeholders are aware of the Grievance Mechanism. • Receives and reports complaints to the Grievance Administrator and participates to the resolution process. • Serves as the main point of contact with the complainants. • Maintains dialogue with the complainants during resolution. • Provides regular feedback about attitudes and opinions of stakeholders to the Project HSE Manager regarding their perceptions / understanding of the Project.
Grievance Administrator	• Helps the Project HSE Manager to adapt the grievance procedure to the local context and culture. • Is assigned to investigate and design a solution to a grievance and follows up document status and progress. • Ensures that a response is provided to the complainant in a timely and fair manner. • Coordinates internally grievance reception and resolution with internal parties involved in the process.

Role	Responsibility
	• Maintains a grievance register and archives all supporting documentation (forms, letters, photos, etc.). • Reports on a regular basis on the status of grievances, prepares monthly (if any grievances received) and yearly reports with an analysis of Key Performance Indicators (KPIs). • Regularly reviews the complaints and their causes to identify changes to existing procedures and practices.

Source: ERM, 2024

7.3.2 GRIEVANCE CHANNELS

7.3.3 GRIEVANCE PROCESS

The Project will develop and implement a grievance mechanism whereby Wali and local community members and labourers can raise any issues of concern. Grievances may be verbal or written and are usually either specific claims for damages/injury or complaints or suggestions about the way that the Project is being implemented. When a grievance has been brought to the attention of the Project team, it will be logged and evaluated. The person or group with the grievance is required to present grounds for making a complaint or claiming loss so that a proper and informed evaluation can be made.

Where a complaint or claim is considered to be valid, then steps are required to be undertaken to rectify the issue or agree compensation for the loss. In all cases the decision made and the reason for the decision will be communicated to the relevant stakeholders and recorded. Where there remains disagreement on the outcome then an arbitration procedure may be required to be overseen by a third party (e.g. government official). Local community stakeholders will be informed on how to implement the grievance procedures.

The Grievance Mechanism Process consists of six phases, summarized in Figure 7.1.

FIGURE 7.1 ILUSTRATION OF THE GRIEVANCE MECHANISM PROCESS

Source: TotalEnergies 2020

STEP 1: RECEIVE

The Project shall communicate the existence of the grievance mechanism to stakeholders as part of their engagement activities. Stakeholders will be offered different communication channels for submitting a grievance including:

- Directly to the Project Proponent's CLO by filling the dedicated Grievance form in the annex of the Grievance Management Procedure in force and submitted to one of the dedicated locations.
- Directly to the Project Proponent's CLO or EPC CLO, during engagement activities.
- Using the phone number 00968 92120082 and email address NOS.Grievance@oq.com .
- Using feedback forms which will be available via the same link where the ESIA (version B) and the Non-Technical Summary in Arabic language will be uploaded.

Indirectly through the appointed grievance coordinator within the EPC contractor in the course of their duties as well as through the local community representatives (Sheiks).
Through other designated access points including a dedicated phone number and letters to the Project site office or contact form of the Project website.

These grievances may be in written form or verbal complaints and shall be treated with equal respect. The filing of grievances shall be made easy for communities with various levels of literacy and shall be accessible and culturally appropriate. The log will include details of the complaint (unless anonymous) and details of the grievance.

All grievances or complaints submitted by stakeholders and received by a Project Proponent's or EPC Contractor personnel shall be channeled to the CLO who will be responsible for logging the grievance. Where the CLO is able to resolve the grievance, they will proceed to do so. It is envisaged that many grievances will be able to be resolved quickly between the CLO and the complainant. The grievance management will be described in detail in the Project Proponent's Grievance Management Procedure. An NTS (or flyer) describing the Grievance Mechanism shall be disseminated to the communities prior to the start of any engagement activities.

7.3.3.1 STEP 2: ACKNOWLEDGE

Project Proponent shall acknowledge receipt of the complaint within a standardised time period (period to be defined in consideration of the particularities of the local context in the Grievance Management Plan) and explain to the complainant the process including timelines of the remaining steps in the procedure.

7.3.3.2 STEP 3: ASSESS AND ASSIGN

Project Proponent will screen and assess complaints to determine eligibility before starting the investigation process. Eligible complaints may include those where:

- The complaints pertain to the Program; or
- The issues raised in the complaint fall within the scope of issues this GM is authorized to address.

Ineligible complaints may include those where:

- The complaint is not related to the Program;
- The nature of the issue is outside the scope of the GM or outside of Project Proponent's control;
- There are other formal mechanisms, institutions, or community procedures more appropriate to address the issue
- The complaint is made by a person other than an eligible stakeholder; or
- The complainant has demonstrated malevolent intent.

If the complaint is determined to be not eligible, Project Proponent will communicate it to the complainant as well as the reasons for the rejection. The ineligible grievance will be marked as closed and registered in the Grievance Log. If the complaint is deemed eligible, it will be categorized by type (question, suggestion, complaint) and topic (employment, health and safety, human resources, gander-based violence) and Project Proponent will start an investigation process. Project Proponent will also issue an acknowledgement of receipt to complainants with eligible grievances.

7.3.3.3 STEP 4: INVESTIGATE

The CLO will work with other responsible members of the Project team to investigate the grievance and identify additional information to clarify the situation and/or improve communication between the stakeholder and Project Proponent and corrective or preventive measures to properly address the grievance. If necessary, if the grievance relates to a given site or location, the community liaison team will organize a site inspection. The investigation phase shall be conducted in a collaborative & transparent manner with concerned grievant & stakeholders.

7.3.3.4 STEP 5: PROPOSE

The CLO will communicate the response, stipulate mutual commitments, and ask for the complainants' agreement. If the complainant is not satisfied with the resolution, or the outcome of the agreed corrective actions the response should be reviewed and if appropriate amended in light of any discussions or negotiations. Where appropriate, the Project Proponent and the Wali's office will be involved in this step to resolve certain complaints (where their involvement is necessary or recommended).

If the complainant is still not satisfied with the resolution, or the outcome of the agreed corrective actions, they should be free to take their grievances to a dispute resolution mechanism outside of Project Proponent's grievance mechanism.

7.3.3.5 STEP 6: FOLLOW UP AND CLOSE OUT

Where the stakeholder is satisfied with the responses provided to their grievances, the specific grievances will be concluded by the CLO and the register updated to indicate as much. All correspondence will be filed, and the corrective actions clearly updated against the grievances.

The Project Proponent will ensure that all grievances raised by all Project stakeholders are treated impartially, respectfully and confidentially.

8. ROLES AND RESPONSIBILITIES

The table below summarizes the key roles and responsibilities in relation with the management and implementation of the SEP. Roles and responsibilities will be reviewed as the management structure is adjusted to fit Project development and related engagement needs.

Role	Responsibility/Accountability
Project Proponent Management	Responsibilities include: • Ensure proper implementation and follow up of the SEP. • Ensure that relevant Project's employees are informed and trained on the SEP. • Ensure that a function in charge of Social Performance (SP) is nominated and an adequate structure is put in place to ensure efficient implementation of the SP strategy including the SEP. • Provide resources to ensure that interests of stakeholders are represented and taken into consideration during all phases of the Project • Ensure that there are sufficient available resources for achieving engagement activities. • Monitor and review stakeholder engagement required to assess effectiveness and frequency of activities as well as implementation of associated actions/commitments that have been documented. • Ensures the proper implementation and follow up of the grievance mechanism procedure. Involved in the resolution of complaints of high complexity, difficulty or priority.
Project Proponent's Health, Safety, Environment and Social Manager (HSES Manager) or another nominated Manager (i.e. SP Manager)	Reports to the Project Proponent's Management. Responsibilities include: • Monitor the implementation of the stakeholder engagement plan: review the plan of the stakeholder engagement activities and ensure they are appropriately implemented. • Monitor the implementation of the grievance mechanism: review the management the grievance mechanism and grievance resolution process, supervision of the logged grievances and other issues in a timely manner, in line with the grievance process, TTE standards and best practice principles. • Be in permanent communication with the CLO to be informed about the grievances' resolution status. • Perform training and awareness sessions of employees and contractors on local community relations and SEP.

Role	Responsibility/Accountability
Project Proponent's Community Liaison Officer (CLO)	Reports to the Project Proponent's HSES Manager or another nominated manager. Responsibilities include: • Communicating with the Walis, sheikhs and the local community generally, including notifying the relevat Wali prior to the start of construction works. • Plan and lead the stakeholder engagement activities and coordinate the results and actions to be taken. • Manage and implement the grievance mechanism and grievance resolution process. • Maintain regular contact with communities especially the potentially affected through regular community visits to monitor opinions and provide updates on Project activities and ensuring communication with vulnerable groups. • Maintain updated the stakeholder register, mapping and the stakeholder engagement activities register and records. • Produce stakeholder engagement monitoring reports and submit to the hierarchy. • Liaise and coordinate activities with EPC CLO and staff to ensure they comply with the SEP.
EPC Contractors Community Liaison Officer (CLO)	Reports to the Project Proponent's CLO. Responsibilities include: • Comply with requirements stated under this document and relevant Project Management System applicable to Contractors. • Provide assistance to the Project Proponent's CLO to ensure compliance with this plan. • Communicate concerns, questions or views to the Project Proponent's CLO on compliance or implementation of the SEP. • Provide data related to SEP performance/monitoring as required. • In coordination with Project Proponent's CLO, communication with the Project stakeholders including vulnerable groups and implementation of stakeholder engagement activities described in this SEP. • In coordination with the Project Proponent's CLO, implement the grievance mechanism and grievance resolution process, including dissemination of information regarding the grievance process to ensure that it is widely understood among stakeholders.

Role	Responsibility/Accountability
	• Ensure that construction areas which will be inaccessible to livestock during construction are clearly marked. Signage will be installed, in the appropriate language to notify herders and the local community. The site will be kept in a state that limits the risk of injury or death to camels should they enter the construction area.
Environmental Manager	• Focal point for discussions with the EA about any modifications to the scope of works, reporting of incidents, identified non- conformances, changes in the Project site boundary, and any other reported environmental issues.
All Project personnel, including subcontractors	• Responsible for communicating any potential environmental issues, including chemicals spills, excessive waste, excessive dust generation, uncontrolled discharges, suspicion of soil or water contamination, discovery of heritage item, complaint, etc.

9. MONITORING AND REPORTING

9.1 INTRODUCTION

In order to record activities and assess the effectiveness of this SEP and associated community dialogue activities, the Project Proponent will implement a data management and monitoring process as outlined below.

In addition, this section includes mechanisms for reporting to external stakeholders as an integral step in building relationships with stakeholders and promoting understanding between the Project Proponent and its stakeholders.

The SEP is a living document that will be revised and modified to be developed when needed throughout the Project's different phases of construction and operation, as well as if there are any modifications regarding the activities undertaken by the Project Proponent.

9.2 MONITORING STAKEHOLDER ENGAGEMENT ACTIVITIES

The success in the implementation of the SEP will be monitored by the Project Proponent throughout the Project life cycle against the following sets of criteria:

- Continuation of the consultation process throughout the Project life cycle, maintaining active lines of communication and disclosure of Project information and phasing through the identified channels at the established frequency with all key stakeholders.
- Regular review and maintenance of the Grievance Redressal Mechanism, ensuring grievances, if any, are addressed involving affected men and women, including host communities, through mutually agreeable solutions.

- Inclusion of disadvantaged or vulnerable individuals and groups, with necessary actions to ensure that these groups are fully informed and aware of the Project.
- Inclusion of disadvantaged or vulnerable individuals and groups. In particular, by taking necessary actions to ensure that vulnerable groups are fully informed and aware of the Project.

There are two methods through which the stakeholder engagement process will be (and has been) monitored:

1. **Review of engagement activities in the field:**

- During engagement with stakeholders, the ESIA team will follow a semi-structured focus group discussion by asking questions to participants, depending on the stakeholder group, to ensure that information and messages are being conveyed clearly between the Project team and stakeholder(s).
- The ESIA team will conduct debriefing sessions while in the field. This method will be used to assess whether the required outcomes of the stakeholder engagement process are being achieved, and to provide the opportunity to amend the process where necessary.
- The approach to engagement and messages to be used will also be discussed with Project staff to gain their feedback.

2. **The use of engagement tools developed through the ESIA engagement including the:**
    - Stakeholder register; and
    - Meeting records of all consultations held.

9.3 DATA MANAGEMENT

Stakeholder engagement activities will be documented and filed in order to track and refer to records when required and ensure delivery of commitments made to stakeholders. The following stakeholder community dialogue records and documentation will be used and maintained by the Project Proponent:

- Stakeholder register: On-going updates to the stakeholder register, including key contacts and contact details (telephone number, email address etc.) as additional stakeholders are identified.
- Stakeholder engagement log: Used to store, analyse and report on stakeholder dialogue activities. It will be populated with details on information presented, audience questions, the Project Proponent responses and actions, and meeting evaluation results, when appropriate. The database will also be used to track frequency of meetings over the life of the project.
- Commitments register: Used to keep track of the commitments, if any, made to various stakeholders.
- Meeting minute template: Used to collect meeting minutes to be filed within the stakeholder database.
- Grievance log: Used to record all grievances received, management actions and whether it has satisfactorily been closed out.

Records will be reviewed on a quarterly basis to ensure that information is being recorded accurately and information maintained. Commitments and actions recorded during community interaction activities will also be regularly reviewed to ensure they are taken forward.

9.4 REPORTING STAKEHOLDER ENGAGEMENT ACTIVITIES

Evaluation of performance will assess the extent to which the engagement activities and outputs met those outlined in the SEP. In assessing performance, the following will be considered:

- materials disseminated: types, frequency, and location;
- place and time of formal engagement events and level of participation by specific stakeholder groups (e.g. women, youth);
- number of comments received, type of stakeholder and details of feedback provided;
- numbers and type of stakeholders who come into contact with the Project team by mail, phone call or any other means of communication;
- meeting minutes, attendance registers and photographic evidence;
- comments received by government authorities, and other parties and passed on to the Project; and
- numbers and types of feedback and / or grievances and the nature and timing of their resolution

9.4.1 INTERNAL REPORTING

The following internal reports will be developed:

- Red Flag Reports: Weekly or daily reports for urgent items or incidents of significant nature. These red flag reports will be prepared by the Project Proponent CLO in collaboration with the EPC CLO and sent to the Project Proponent's HSES Manager or nominated Manager in charge, which will take action and/or escalate if necessary.
- Quarterly Progress Reports: Internal quarterly progress reports will be prepared by the Project Proponent's CLO in collaboration with the EPC CLO. These reports will summarise:
  - Engagement activities undertaken this far: stakeholders met, key topics discussed, main concerns and expectations, positioning towards Project activities;
  - Grievance mechanism: Number of grievances received their nature, how they were tackled or the progress of their resolution, and whether there are measures that were agreed to be taken.
  - Social license risks to the Project;
  - Limitations (e.g. resources, internal alignment); and
  - Priorities for next quarter.

9.4.2 STAKEHOLDER INFORMATION REPORTING

Once consultation with stakeholders has taken place, stakeholders generally want to know which of their suggestions have been taken on board, what risk or impact mitigation measures will be put in place to address their concerns, and how, for example, projects impacts are being monitored.

It is recommended to keep track of commitments made (through the commitments register) and to communicate progress made against these commitments on a regular basis (for instance during regular meetings with the community representatives). The commitment register of the ESIA shall be the starting base.

10. REFERENCES

IFC, European Bank for Reconstruction and Development (EBRD), and CDC Group. Addressing Gender-Based Violence and Harasssment – Emerging Good Practice for the Private Sector. https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/publications/publications_gpn_addressinggbvh

APPENDIX A STAKEHOLDER REGISTER

The table below presents the relevant stakeholder for the ESIA process.

Stakeholder – English name (Arabic name in brackets)	**Connection to the Project and Interest/Impact Areas**
Project Affected communities/ Parties	
Project workers include those directly employed, as well as those employed by Project contractors	• Project workers are key to the success of the Project. Their working conditions and labour rights are impacted by how the Project manages its workers and contractors.
PDO's personnel and contractors working and/or living within the AoI	• Personnel at PDO camps within the AoI, may occasionally enter the AoI to service the established wells and/or to drill new wells in the future. • Areas of interest/ impact may include disturbance due to traffic from construction activities and logistics from oversized loads (i.e., turbine blades) and HSE related risks and incidents.
Sheikh of Sayh Nuhaydah	• The Sheiks are elected local community leaders acting as representatives of their local community (at settlement level). Elected sheikhs are likely to be from the dominant tribe within the community. They are key leadership figures at local level. • These communities must be made aware of the Project's schedule and its planned activities and of the potential benefits that will come in the form of employment and Community Investment or CSR if applicable. • Areas of interest/ impact include access to and land use for grazing
Sheik of Abu Thaylah	
Other transient tribes	• Communities may be directly or indirectly affected by the proposed Project and its activities. May require to be made aware to the Project's schedule and its planned activities, particularly around temporary closure of access to potential grazing areas during construction and decomissioning phases. • Areas of interest/ impact include access to and land use for grazing.
Other interested parties: Institutional Environmental Authorities	
Environment Authority	• Local environmental authority and regulator required to be engaged with throughout the Project lifecycle.

Other interested parties: Concerned Ministries	
Government health centers	• Local public services including educational, health and law enforcement related stakeholders that potentially may be directly or indirectly affected by the Project activities or the Project's associated social and environmental impacts.
Law enforcement: Royal Oman Police	
Law enforcement: Royal Omani Police (Traffic Department)	
Other interested parties: District and Local Governmental Entities and Institutions	
Wali of Adam	• The Governorate and Local Government (Majlis Al Shura and Wali) are of importance to the Project as they are responsible for implementation of legislation, and development plans and policies at the Governorate/Wilayat level. • The Majlis Al Shura constitute the Consultative Assembly of the Central Government of Oman. The Consultative Assembly has 83 elected members (Shura Members) drawn from Oman's 59 Wilayats. • The Wali is designated by the Central Government (Ministry of Interior) and are the head of the Sheiks. There is one Wali per Wilayat (district of a Governorate). They are key leadership figures at local level.
Head of Municipality Adam	
Majlis Ashura representatives Adam	
Member of Adam Municipal Council	
Other Interested parties: Other Governmental Entities	
Ministry of Labour	• Central Government Authorities (Ministries in Muscat and/or their Regional Offices) are of primary political importance to the Project in terms of establishing policy, granting permits or other approvals, and monitoring and enforcing compliance with Omani Law throughout all stages of the Project life-cycle. • These Ministries may hold relevant baseline data for the Project area.
Ministry of Transport, Communications and Information Technology	
Ministry of Social Development	
Ministry of Agriculture, Fisheries and Water Resources	
Ministry of Health	
Ministry of Heritage and Tourism	
Ministry of Education	
Ministry of Housing and Urban Planning	

Ministry of Justice and Legal Affairs	
Directorate General (DG) offices of Ministries.	
Civil Defense and Ambulance Authority (CDAA)	
Other Interested parties: Aviation Oversight Authority	
Civil Aviation Authority (CAA)	• The Civil Aviation Authority (CAA) is responsible for ensuring air transport safety and monitors aviation operations. • A No Objection Certificate (NOC) has been obtained from CAA, in which the Project Proponent has committed to use anti-reflection panels.
Other Interested parties: Lenders	
Project Lenders/ Commercial Banks	• Project Lenders are not known at this stage. They are exposed both financially and reputationally to project risks. • They can impose their environmental and social policies to the project design, development and implementation.
Other Interested parties: Civil Society	
Omani Women's Association Adam	• Organizations with direct interest in the Project, and its social and environmental aspects, and that are able to influence the Project directly or through public opinion. • Such organisations may also have useful data and insight and may potentially become partners to the Project in areas of common interest such as the implementation of community investment or CSR projects if applicable.
Other Interested parties: Media	
Arabic and English Newspapers	• Local, regional and national level media will typically have a higher level of influence over the Project and may be leveraged to influence local stakeholders' perceptions of the Project.

APPENDIX B RECORDS OF STAKEHOLDER MEETINGS

STAKEHOLDER ENGAGEMENT LOG

Day	Date	Time	Venue/Location	Type of Engagement (KII, FGD, etc.)	Attendees (name, organization, and role)	Number of attendees (Total/women/ men)	Purpose of the engagement (Letter/Meeting) information requested and follow up action required	Main Issues, Concerns and Feedback Reported	Commitments Made	Minutes of Meeting
1	Sunday 14.07.2024	09:00 AM	Wali's Office of Adam, Adam	KII	Mohammed Zabnoot (Wali of Adam) Sultan Al Alawi (Deputy Wali) Salim Al Mahrooqi (Member of Al Shura Council) Nasser Al Busaidi (Member of Municipal Council) Sultan Al Mahrooqi (Member of Municipal Council) Fawzi Al Amri (Director of the Municipality Department in Adam) Maryam Al Mahrooqi (Planning Specialist at the Wali's Office in Adam) Maryam Al Kalbani (OQAE Senior Environmental Engineer) Dalal Darwish (5OES Social Lead) Haitham Al Wahaibi (5OES Social Engagement Expert)	Total 11 Men 7 Women 4	Early Project disclosure and baseline data collection.	Barriers to employment	The Wali's office to share information about the current population of Bu Thaylah. The Wali's office to share details about Sayh An Nuhaydah, including the area's extent and whether it falls within the project's AoI. 5oes to write a letter to the Wali's office requesting for the above-mentioned information. 5oes to share the meeting minutes along with a copy of the presentation material with the Wali's office.	Cross reference to minutes below

					Rayyan Al Balushi (5OES Junior Environmental and Social Consultant)					
		11:00 AM	Omani Women Association in Adam	FGD	Thamna Al Shibani (President) Radhiya Al Mahrooqi (Deputy President) Zayana Al Mahrooqi (Administrative Coordinator) Hamida Al Waili (Administrative Member) Najlaa Al Mahrooqi (Treasurer) Maryam Al Kalbani (OQAE Senior Environmental Engineer) Dalal Darwish (5OES Social Lead) Rayyan Al Balushi (5OES Junior Environmental and Social Consultant)	Total 8 (women only)	Early Project disclosure and baseline data collection.	Absence of street lights outside Adam town boundaries	No follow-up actions	Cross reference to minutes below

MEETING MINUTES

MEETING WITH THE WALI'S OFFICE OF ADAM

Date: 14/07/2024

Present	**Wali's Office of Adam:** Mohammed Zabnoot (Wali of Adam); Sultan Al Alawi (Deputy Wali); Salim Al Mahrooqi (Member of Al Shura Council); Nasser Al Busaidi (Member of Municipal Council); Sultan Al Mahrooqi (Member of Municipal Council); Fawzi Al Amri (Director of the Municipality Department in Adam); Maryam Al Mahrooqi (Planning Specialist at the Wali's Office in Adam) **OQAE:** Maryam Al Kalbani **5OES:** Dalal Darwish; Haitham Al Wahaibi; Rayyan Al Balushi
Time	09:00 am
Location	Wali's Office of Adam, Adam

Item	Note
1	**Introduction**
	The project details of the solar farm project were presented by Dalal.
	The purpose of the meeting was explained, questions were raised, and the responses and requirements of the attendees were noted.
2	**Project Details**
	The project was explained by Maryam as a partnership between OQ Alternative Energy and TotalEnergies.
	Attendees requested clarification on the project's waste management plan, highlighting existing issues with the sewage plant and waste dumps.
	It was explained that a waste management plan for each project phase would be established and agreed upon with the subcontractor, ensuring adherence to local and international standards.
	An inquiry was made about why Wilayat Adam was chosen for the solar energy project.
	The response indicated that the selection was based on preliminary studies identifying the most suitable areas for solar energy projects.
	Attendees asked whether the project would provide sufficient electricity for PDO.
	The solar power plant is expected to contribute to the overall energy demand of the company and minimize its carbon footprint.
	Project Impacts
	Attention was focused on the significance of local value addition, the project's environmental impacts, and impacts on nearby residents and their camels, as well as the benefits, including the provision of electricity to the residents of Bu Thaylah and Sayh An Nuhaydah.
	Maryam confirmed that there are no direct environmental impacts from the project, as it is a solarfarm project and considered environmentally friendly. However, there are potential impacts discussed.

The Wali's office noted that when projects are initiated in the Wilayah, the community often seeks information about the benefits they will receive.

Attendees anticipate various benefits from the Project, including jobs in roles such as waste transport and solar panel cleaning, a focus on local employment, electricity provision to neighboring areas, contributions to schools, and the establishment of ongoing, sustainable community initiatives.

It was clarified that the project will be fully enclosed with fencing during both construction and operation.

It was also mentioned that the solar panels may reflect light in a way that resembles water, potentially attracting water birds.

Socioeconomic Information

It was confirmed that the predominant tribe in Bu Thayla and Sayh An Nuhaydah is Al-Durai.

The primary sources of income include selling camels and private sector jobs in oil and gas companies operating in the area.

Employment and Education

The employment rate varies based on the specific roles required for the project and the number of employees needed.

It was confirmed that the Wilayat has residents with advanced degrees, including master's and PhD qualifications.

Although oil and gas companies in the area offer some job opportunities, they do not prioritize local employment.

Residents should be informed that these temporary opportunities are valuable for gaining experience.

Road Safety

Traffic accidents involving camels have been reported.

A suggestion was made to support the installation of road fencing.

Dust-related accidents, particularly on the road from Zahia Bridge to Wilayat Haima, require technical solutions.

Archaeological Sites

It was clarified that there are no archaeological sites in the area, but it is advisable to consult the Ministry of Heritage and Tourism.

Grazing Activities

It was noted that the presence of residents engaged in grazing near the project site could not be confirmed due to their frequent and seasonal movements.

3 Concerns and Complaints

The Wali's office identified centralized employment as a barrier.

4 Recommendation

It was suggested to involve members of the municipal council in the grievance mechanism.

The Wali's office requested that clarification and details on the project's community contributions be presented in upcoming meetings.

5 **Follow Up-Action**

The Wali’s office to share information about the current population of Bu Thaylah.

The Wali's office to share details about Sayh An Nuhaydah, including the area’s extent and whether it falls within the project’s AoI.

5oes to write a letter to the Wali’s office requesting for the above-mentioned information.

5oes to share the meeting minutes along with a copy of the presentation material with the Wali’s office.

6 **Photographic Evidence**

ESIA team carrying out early project disclosure engagements at the Wali’s office in Adam

NAME OF STAKEHOLDER (ACCRONYM)

Date: 14/07/2024

Present:	**OWA of Adam:** Thamna Al Shibani (President); Radhiya Al Mahrooqi (Deputy President); Zayana Al Mahrooqi (Administrative Coordinator); Hamida Al Waili (Administrative Member); Najlaa Al Mahrooqi (Treasurer) **OQAE:** Maryam Al Kalbani **5OES:** Dalal Darwish; Haitham Al Wahaibi; Rayyan Al Balushi
Time	11:00 am
Location	OWA Centre of Adam, Adam

Item	Note
1	**Introduction** The project details of the solar farm project were presented by Dalal. The purpose of the meeting was explained, questions were raised, and the responses and requirements of the attendees were noted.
2	**Project Impacts** It was confirmed that the project team is currently exploring opportunities to maximize community benefits for the most significant social impact. It was mentioned that one of the project's benefits is the creation of jobs and local contractor agreements. **Socioeconomic information** It was confirmed that handicraft activities in Adam include palm frond crafts and silverwork, practiced by a number of small, low-income families. **Employment** It was explained that employment opportunities related to the project are limited because solar energy projects require a small workforce. However, despite being temporary, these jobs provide valuable experience.
3	**Concerns and Complaints** One issued faced by the residents in Adam is the absence of street lighting once they leave Adam.
4	**Recommendation** It was suggested that the local residents be informed about the project to avoid complaints and grievances. It was suggested to provide electricity connection generated from the solar farm to the areas neighbouring the project, such as Bu Thayla.
5	**Follow-up Actions** No follow-up actions required.
6	**Photographic Evidence** ESIA team carrying out early project disclosure engagements at the OWA Centre in Adam

APPENDIX C GRIEVANCE MANAGEMENT FORM

Grievance Form

Reference number (assigned by the receiving entity):	
Date:	

Please enter your contact details and your grievance. This information will be treated as confidential.

Note: If you wish to remain anonymous, please enter your comment/grievance in the box below without providing any contact details - your comments will still be taken into account by the agency.

Full name	
Anonymous submission	☐ **I wish to remain anonymous** ☐ **I request not to disclose my identity without my consent**
Please indicate how you wish to be contacted (post, telephone, e-mail).	☐ **By post (please provide postal address):** _____ ☐ **By telephone (please state telephone number):** _____ ☐ **By WhatsApp (please provide phone number)** _____ ☐ **By e-mail (please provide e-mail address)** _____ ☐ **Other (e.g. XX office, XX website or Facebook) please specify):** _____
Preferred language of communication	☐ **English** ☐ **Xx** ☐ **xxx** ☐ **Other (xxx etc.), please specify: _____**

Description of the Incident or Grievance:	What happened? Where did it happen? Who did it happen to? What is the problem?

Date of Incident/Grievance:	☐ **Single incident/grievance (date _____)** ☐ **Has it happened more than once (how many times)? _____)** ☐ **In progress (currently experiencing difficulties)**
What would you like to see happen to resolve the problem?	
Signature	

APPENDIX G LABORATORY ANALYTICAL RESULTS

LONESTAR ALPHA LABORATORIES

TEST CERTIFICATE - ANALYSIS OF SOIL

Report No.	LMCHE - 24-1154/11	**Date Reported**	03 Jun 2024
Cust Ref.	-	**Date Received**	20 May 2024

1. Information Provided By Customer

Customer	**FIVE OCEANS ENVIRONMENTAL SERVICES LLC** PO Box 660 PC 131 Sultanate of Oman
Project	M19010 TE_PDO ESIA
Sample Description	Soil - Sample ID: Soil 1 Solar 1

Sampled By	Customer	**Sampling Date & Time**	10/05/2024
Sample Brought By	Customer	**Sampling Method**	NG

2. Information Provided By Laboratory

Date Tested	20 May 2024 ~ 03 Jun 2024	**Method Variation**	Nil
Test Location	MCT	**LAL Sample No.**	CHE / 2272
Remarks	None		

3. Test Results

TEST	UNIT	TEST METHOD	MDL	RESULTS
****Pesticides**				
4.4'-DDD	mg/kg	USEPA SW 846/8081	0.01	<0.01
4.4'-DDE	mg/kg	USEPA SW 846/8081	0.01	<0.01
4.4'-DDT	mg/kg	USEPA SW 846/8081	0.01	<0.01
Aldrin	mg/kg	USEPA SW 846/8081	0.01	<0.01
alpha-BHC	mg/kg	USEPA SW 846/8081	0.01	<0.01
beta-BHC	mg/kg	USEPA SW 846/8081	0.01	<0.01
gamma-BHC(Lindane)	mg/kg	USEPA SW 846/8081	0.01	<0.01
delta-BHC	mg/kg	USEPA SW 846/8081	0.01	<0.01
Dieldrin	mg/kg	USEPA SW 846/8081	0.01	<0.01
Endrin	mg/kg	USEPA SW 846/8081	0.01	<0.01
Chemical Tests				
Cyanide (1:1 Soil:Water Extract)	mg/kg	HACH 8027	0.01	<0.01
Arsenic	mg/Kg	USEPA SW 846/6010 C	0.3	<0.3
Barium	mg/Kg	USEPA SW 846/6010 C	1	80
Cadmium	mg/kg	USEPA SW846/6010 C	0.2	<0.2
Chromium	mg/Kg	USEPA SW 846/6010 C	1	49
Cobalt	mg/kg	USEPA SW846/6010 C	1	7
Copper	mg/kg	USEPA SW846/6010 C	1	9
Lead	mg/kg	USEPA SW846/6010 C	1	3
Mercury	mg/kg	USEPA SW846/6010 C	0.1	<0.1

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Report No.	LMCHE - 24-1154/11	Date Reported	03 Jun 2024
Cust Ref.	-	Date Received	20 May 2024

TEST	UNIT	TEST METHOD	MDL	RESULTS
Molybdenum	mg/Kg	USEPA SW 846/6010 C	0.1	<0.1
Nickel	mg/kg	USEPA SW846/6010 C	1	86
Zinc	mg/kg	USEPA SW 846/6010 C	2	18
**Total petroleum Hydrocarbons				
**GRH (C5-C9)	mg/kg	TNRCC Method 1005/1006	0.05	<0.05
**DRH (C10-C28)	mg/kg	TNRCC Method 1005/1006	0.05	<0.05
**Heavy Fractions (>C29)	mg/kg	TNRCC Method 1005/1006	10	<10
**VOC				
Bromobenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Bromochloromethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Bromodichloromethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Bromoform	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Bromomethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Carbontetrachloride	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Chlorobenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Chloroform	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Choloroethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Cholоromethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
2-Chlorotoluene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
4-Chlorotoluene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Dibromochloromethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2-Dibromo-3-chloropropane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2 Dibromomethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Dibromomethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2-Dichlorobenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,3-Dichlorobenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,4-Dichlorobenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,1-Dichloroethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2-Dichloroethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,1-Dichloroethene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
cis-1,2-Dichloroethene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Trans-1,2-Dichloroethene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Dichlorofluoromethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2-Dichloropropane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,3-Dichloropropane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05

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Report No.	LMCHE - 24-1154/11	Date Reported	03 Jun 2024
Cust Ref.	-	Date Received	20 May 2024

TEST	UNIT	TEST METHOD	MDL	RESULTS
2,2-Dichloropropane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,1-Dichloropropene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
cis-1,3-Dichloropropene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
trans-1,3-Dichloropropene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Hexachlorobutadiene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Dichloromethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2,3-Trichlorobenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2,4-Trichlorobenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,1,1,2-Tetrachloroethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,1,2,2-Tetrachloroethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Tetrachloroethene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,1,1-Trichloroethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,1,2-Trichloroethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Trichloroethene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Trichlorofluoromethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2,3-Trichloropropane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2,4-Trimethylbenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Vinyl Chloride	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
n-Butyl benzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
sec-Butyl benzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Tert-Butyl benzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Isopropyl benzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
p-Isopropyltoluene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Napthalene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
n-propyl benzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Styrene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Benzene	mg/kg	USEPA SW846/8260B	0.05	<0.05
Ethyl benzene	mg/kg	USEPA SW846/8260B	0.05	<0.05
Toluene	mg/kg	USEPA SW846/8260B	0.05	<0.05
o-Xylene	mg/kg	USEPA SW846/8260B	0.05	<0.05
m-Xylene	mg/kg	USEPA SW846/8260B	0.05	<0.05
p-Xylene	mg/kg	USEPA SW846/8260B	0.05	<0.05
1,3,5-Trimethylbenzene	mg/kg	USEPA SW846/8260B	0.05	<0.05
**PAH				
Acenaphthene	mg/kg	USEPA SW 846/8270D	0.01	<0.01

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Report No.	LMCHE - 24-1154/11	Date Reported	03 Jun 2024
Cust Ref.	-	Date Received	20 May 2024

TEST	UNIT	TEST METHOD	MDL	RESULTS
Acenaphthylene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Anthracene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Benz(a)anthracene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Benzo(a)pyrene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Benzo(b)Fluoranthene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Benzo(g,h,i)perylene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Benzo(k)Fluoranthene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Chrysene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Dibenz(a,h)anthracene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Fluoranthene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Fluorene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Indeno(1,2,3,-cd)pyrene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Naphthalene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Phenanthrene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Pyrene	mg/kg	USEPA SW 846/8270D	0.01	<0.01

** Subcontracted , MDL = Method Detection Limit

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For and behalf of Lonestar Alpha Laboratories
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*** End of the test report ***

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LONESTAR ALPHA LABORATORIES

TEST CERTIFICATE - ANALYSIS OF SOIL

Report No.	LMCHE - 24-1154/12	**Date Reported**	03 Jun 2024
Cust Ref.	-	**Date Received**	20 May 2024

1. Information Provided By Customer

Customer	**FIVE OCEANS ENVIRONMENTAL SERVICES LLC** PO Box 660 PC 131 Sultanate of Oman
Project	M19010 TE_PDO ESIA
Sample Description	Soil - Sample ID: Soil 2 Solar 1

Sampled By	Customer	**Sampling Date & Time**	10/05/2024
Sample Brought By	Customer	**Sampling Method**	NG

2. Information Provided By Laboratory

Date Tested	20 May 2024 ~ 03 Jun 2024	**Method Variation**	Nil
Test Location	MCT	**LAL Sample No.**	CHE / 2273
Remarks	None		

3. Test Results

TEST	UNIT	TEST METHOD	MDL	RESULTS
****Pesticides**				
4.4'-DDD	mg/kg	USEPA SW 846/8081	0.01	<0.01
4.4'-DDE	mg/kg	USEPA SW 846/8081	0.01	<0.01
4.4'-DDT	mg/kg	USEPA SW 846/8081	0.01	<0.01
Aldrin	mg/kg	USEPA SW 846/8081	0.01	<0.01
alpha-BHC	mg/kg	USEPA SW 846/8081	0.01	<0.01
beta-BHC	mg/kg	USEPA SW 846/8081	0.01	<0.01
gamma-BHC(Lindane)	mg/kg	USEPA SW 846/8081	0.01	<0.01
delta-BHC	mg/kg	USEPA SW 846/8081	0.01	<0.01
Dieldrin	mg/kg	USEPA SW 846/8081	0.01	<0.01
Endrin	mg/kg	USEPA SW 846/8081	0.01	<0.01
Chemical Tests				
Cyanide (1:1 Soil:Water Extract)	mg/kg	HACH 8027	0.01	<0.01
Arsenic	mg/Kg	USEPA SW 846/6010 C	0.3	<0.3
Barium	mg/Kg	USEPA SW 846/6010 C	1	69
Cadmium	mg/kg	USEPA SW846/6010 C	0.2	<0.2
Chromium	mg/Kg	USEPA SW 846/6010 C	1	55
Cobalt	mg/kg	USEPA SW846/6010 C	1	8
Copper	mg/kg	USEPA SW846/6010 C	1	12
Lead	mg/kg	USEPA SW846/6010 C	1	8
Mercury	mg/kg	USEPA SW846/6010 C	0.1	<0.1

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Report No.	LMCHE - 24-1154/12	Date Reported	03 Jun 2024
Cust Ref.	-	Date Received	20 May 2024

TEST	UNIT	TEST METHOD	MDL	RESULTS
Molybdenum	mg/Kg	USEPA SW 846/6010 C	0.1	<0.1
Nickel	mg/kg	USEPA SW846/6010 C	1	101
Zinc	mg/kg	USEPA SW 846/6010 C	2	21
**Total petroleum Hydrocarbons				
**GRH (C5-C9)	mg/kg	TNRCC Method 1005/1006	0.05	<0.05
**DRH (C10-C28)	mg/kg	TNRCC Method 1005/1006	0.05	<0.05
**Heavy Fractions (>C29)	mg/kg	TNRCC Method 1005/1006	10	<10
**VOC				
Bromobenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Bromochloromethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Bromodichloromethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Bromoform	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Bromomethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Carbontetrachloride	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Chlorobenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Chloroform	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Choloroethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Cholormethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
2-Chlorotoluene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
4-Chlorotoluene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Dibromochloromethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2-Dibromo-3-chloropropane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2 Dibromomethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Dibromomethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2-Dichlorobenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,3-Dichlorobenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,4-Dichlorobenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,1-Dichloroethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2-Dichloroethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,1-Dichloroethene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
cis-1,2-Dichloroethene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Trans-1,2-Dichloroethene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Dichlorofluoromethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2-Dichloropropane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,3-Dichloropropane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05

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Report No.	LMCHE - 24-1154/12	Date Reported	03 Jun 2024
Cust Ref.	-	Date Received	20 May 2024

TEST	UNIT	TEST METHOD	MDL	RESULTS
2,2-Dichloropropane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,1-Dichloropropene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
cis-1,3-Dichloropropene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
trans-1,3-Dichloropropene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Hexachlorobutadiene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Dichloromethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2,3-Trichlorobenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2,4-Trichlorobenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,1,1,2-Tetrachloroethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,1,2,2-Tetrachloroethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Tetrachloroethene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,1,1-Trichloroethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,1,2-Trichloroethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Trichloroethene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Trichlorofluoromethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2,3-Trichloropropane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2,4-Trimethylbenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Vinyl Chloride	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
n-Butyl benzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
sec-Butyl benzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Tert-Butyl benzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Isopropyl benzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
p-Isopropyltoluene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Napthalene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
n-propyl benzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Styrene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Benzene	mg/kg	USEPA SW846/8260B	0.05	<0.05
Ethyl benzene	mg/kg	USEPA SW846/8260B	0.05	<0.05
Toluene	mg/kg	USEPA SW846/8260B	0.05	<0.05
o-Xylene	mg/kg	USEPA SW846/8260B	0.05	<0.05
m-Xylene	mg/kg	USEPA SW846/8260B	0.05	<0.05
p-Xylene	mg/kg	USEPA SW846/8260B	0.05	<0.05
1,3,5-Trimethylbenzene	mg/kg	USEPA SW846/8260B	0.05	<0.05
**PAH				
Acenaphthene	mg/kg	USEPA SW 846/8270D	0.01	<0.01

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Report No.	LMCHE - 24-1154/12	Date Reported	03 Jun 2024
Cust Ref.	-	Date Received	20 May 2024

TEST	UNIT	TEST METHOD	MDL	RESULTS
Acenaphthylene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Anthracene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Benz(a)anthracene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Benzo(a)pyrene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Benzo(b)Fluoranthene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Benzo(g,h,i)perylene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Benzo(k)Fluoranthene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Chrysene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Dibenz(a,h)anthracene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Fluoranthene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Fluorene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Indeno(1,2,3,-cd)pyrene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Naphthalene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Phenanthrene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Pyrene	mg/kg	USEPA SW 846/8270D	0.01	<0.01

** Subcontracted , MDL = Method Detection Limit

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For and behalf of Lonestar Alpha Laboratories
Muscat

*** End of the test report ***

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LONESTAR ALPHA LABORATORIES

TEST CERTIFICATE - ANALYSIS OF SOIL

Report No.	LMCHE - 24-1154/13	**Date Reported**	03 Jun 2024
Cust Ref.	-	**Date Received**	20 May 2024

1. Information Provided By Customer

Customer	**FIVE OCEANS ENVIRONMENTAL SERVICES LLC** PO Box 660 PC 131 Sultanate of Oman
Project	M19010 TE_PDO ESIA
Sample Description	Soil - Sample ID: Soil 3 Solar 1

Sampled By	Customer	**Sampling Date & Time**	10/05/2024
Sample Brought By	Customer	**Sampling Method**	NG

2. Information Provided By Laboratory

Date Tested	20 May 2024 ~ 03 Jun 2024	**Method Variation**	Nil
Test Location	MCT	**LAL Sample No.**	CHE / 2274
Remarks	None		

3. Test Results

TEST	UNIT	TEST METHOD	MDL	RESULTS
****Pesticides**				
4.4'-DDD	mg/kg	USEPA SW 846/8081	0.01	<0.01
4.4'-DDE	mg/kg	USEPA SW 846/8081	0.01	<0.01
4.4'-DDT	mg/kg	USEPA SW 846/8081	0.01	<0.01
Aldrin	mg/kg	USEPA SW 846/8081	0.01	<0.01
alpha-BHC	mg/kg	USEPA SW 846/8081	0.01	<0.01
beta-BHC	mg/kg	USEPA SW 846/8081	0.01	<0.01
gamma-BHC(Lindane)	mg/kg	USEPA SW 846/8081	0.01	<0.01
delta-BHC	mg/kg	USEPA SW 846/8081	0.01	<0.01
Dieldrin	mg/kg	USEPA SW 846/8081	0.01	<0.01
Endrin	mg/kg	USEPA SW 846/8081	0.01	<0.01
Atrazine	mg/kg	USEPA 525.2/3510 C	0.01	<0.01
Chemical Tests				
Cyanide (1:1 Soil:Water Extract)	mg/kg	HACH 8027	0.01	<0.01
Arsenic	mg/Kg	USEPA SW 846/6010 C	0.3	<0.3
Barium	mg/Kg	USEPA SW 846/6010 C	1	95
Cadmium	mg/kg	USEPA SW846/6010 C	0.2	<0.2
Chromium	mg/Kg	USEPA SW 846/6010 C	1	52
Cobalt	mg/kg	USEPA SW846/6010 C	1	7
Copper	mg/kg	USEPA SW846/6010 C	1	11
Lead	mg/kg	USEPA SW846/6010 C	1	4

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Report No.	LMCHE - 24-1154/13	Date Reported	03 Jun 2024
Cust Ref.	-	Date Received	20 May 2024

TEST	UNIT	TEST METHOD	MDL	RESULTS
Mercury	mg/kg	USEPA SW846/6010 C	0.1	<0.1
Molybdenum	mg/Kg	USEPA SW 846/6010 C	0.1	<0.1
Nickel	mg/kg	USEPA SW846/6010 C	1	94
Zinc	mg/kg	USEPA SW 846/6010 C	2	21
**Total petroleum Hydrocarbons				
**GRH (C5-C9)	mg/kg	TNRCC Method 1005/1006	0.05	<0.05
**DRH (C10-C28)	mg/kg	TNRCC Method 1005/1006	0.05	<0.05
**Heavy Fractions (>C29)	mg/kg	TNRCC Method 1005/1006	10	<10
**VOC				
Bromobenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Bromochloromethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Bromodichloromethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Bromoform	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Bromomethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Carbontetrachloride	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Chlorobenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Chloroform	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Choloroethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Cholоromethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
2-Chlorotoluene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
4-Chlorotoluene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Dibromochloromethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2-Dibromo-3-chloropropane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2 Dibromomethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Dibromomethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2-Dichlorobenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,3-Dichlorobenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,4-Dichlorobenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,1-Dichloroethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2-Dichloroethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,1-Dichloroethene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
cis-1,2-Dichloroethene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Trans-1,2-Dichloroethene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Dichlorofluoromethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2-Dichloropropane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05

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Report No.	LMCHE - 24-1154/13	Date Reported	03 Jun 2024
Cust Ref.	-	Date Received	20 May 2024

TEST	UNIT	TEST METHOD	MDL	RESULTS
1,3-Dichloropropane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
2,2-Dichloropropane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,1-Dichloropropene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
cis-1,3-Dichloropropene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
trans-1,3-Dichloropropene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Hexachlorobutadiene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Dichloromethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2,3-Trichlorobenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2,4-Trichlorobenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,1,1,2-Tetrachloroethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,1,2,2-Tetrachloroethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Tetrachloroethene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,1,1-Trichloroethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,1,2-Trichloroethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Trichloroethene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Trichlorofluoromethane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2,3-Trichloropropane	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
1,2,4-Trimethylbenzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Vinyl Chloride	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
n-Butyl benzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
sec-Butyl benzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Tert-Butyl benzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Isopropyl benzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
p-Isopropyltoluene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Napthalene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
n-propyl benzene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Styrene	mg/kg	USEPA SW 846/8260 B	0.05	<0.05
Benzene	mg/kg	USEPA SW846/8260B	0.05	<0.05
Ethyl benzene	mg/kg	USEPA SW846/8260B	0.05	<0.05
Toluene	mg/kg	USEPA SW846/8260B	0.05	<0.05
o-Xylene	mg/kg	USEPA SW846/8260B	0.05	<0.05
m-Xylene	mg/kg	USEPA SW846/8260B	0.05	<0.05
p-Xylene	mg/kg	USEPA SW846/8260B	0.05	<0.05
1,3,5-Trimethylbenzene	mg/kg	USEPA SW846/8260B	0.05	<0.05
**PAH				

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Report No.	LMCHE - 24-1154/13	Date Reported	03 Jun 2024
Cust Ref.	-	Date Received	20 May 2024

TEST	UNIT	TEST METHOD	MDL	RESULTS
Acenaphthene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Acenaphthylene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Anthracene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Benz(a)anthracene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Benzo(a)pyrene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Benzo(b)Fluoranthene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Benzo(g,h,i)perylene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Benzo(k)Fluoranthene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Chrysene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Dibenz(a,h)anthracene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Fluoranthene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Fluorene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Indeno(1,2,3,-cd)pyrene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Naphthalene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Phenanthrene	mg/kg	USEPA SW 846/8270D	0.01	<0.01
Pyrene	mg/kg	USEPA SW 846/8270D	0.01	<0.01

** Subcontracted , MDL = Method Detection Limit

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For and behalf of Lonestar Alpha Laboratories
Muscat

*** End of the test report ***

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LONESTAR ALPHA LABORATORIES

TEST CERTIFICATE - ANALYSIS OF WATER

Report No.	LMCHE - 24-1153/1	**Date Reported**	27 May 2024
Cust Ref.	-	**Date Received**	20 May 2024

1. Information Provided By Customer

Customer	**FIVE OCEANS ENVIRONMENTAL SERVICES LLC** PO Box 660 PC 131 Sultanate of Oman
Project	M19010 TE_PDO ESIA
Sample Description	Water- Sample ID: QAWS1

Sampled By	Customer	**Sampling Date & Time**	17/05/2024
Sample Brought By	Customer	**Sampling Method**	NG

2. Information Provided By Laboratory

Date Tested	20 May 2024 ~ 27 May 2024	**Method Variation**	Nil
Test Location	MCT	**LAL Sample No.**	CHE / 2258
Remarks	None		

3. Test Results

TEST	UNIT	TEST METHOD	MDL	RESULTS
Chemical Tests				
pH value @ 25°C	Units	APHA 4500 H+B	0.1	7.5
* Alkalinity as CaCO3	mg/L	APHA 2320 B	1	42
Bicarbonates	mg/L	APHA 2320 B	1	51
Calcium	mg/L	APHA 3500 Ca B	1	1011
Calcium Hardness	mg/L	APHA 3500 Ca B	1	2522
Carbonates	mg/L	APHA 2320 B	1	<1
Chlorides	mg/L	APHA 4500 CI-B	1	1117
Conductivity	mS/cm	APHA 2510 B	0.1	9.8
* Copper	mg/L	APHA 3120 B	0.02	<0.02
Fluoride	mg/L	HACH 8029	0.01	1.22
* Iron	mg/L	APHA 3120 B	0.02	<0.02
Magnesium	mg/L	APHA 3500 Mg B	1	57
Magnesium Hardness	mg/L	APHA 3500 Mg B	1	236
* Manganese	mg/L	APHA 3120 B	0.02	<0.02
* Potassium	mg/L	APHA 3120 B	0.2	33.81
* Sodium	mg/L	APHA 3120 B	0.2	950.6
Sulphate	mg/L	APHA 4500 SO_4^{2-}-C	1	2786
* Total Dissolved Solids	mg/L	APHA 2540 C	5	5990
* Total Hardness	mg/L	APHA 2340 C	1	2758
* Zinc	mg/L	APHA 3120 B	0.1	<0.1

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Report No.	LMCHE - 24-1153/1	**Date Reported**	27 May 2024
Cust Ref.	-	**Date Received**	20 May 2024

TEST	UNIT	TEST METHOD	MDL	RESULTS
Nitrate	mg/L	HACH 8171	0.1	1.2
Microbiological Tests				
Escherichia coli	CFU/100mL	APHA 9222 G	1	<1
* Total coliforms	CFU/100mL	APHA 9222 B	1	<1

* This parameter is under the scope of accreditation

MDL = Method Detection Limit, APHA = American Public Health Association, Standard Methods 24th Edition. CFU = Colony Forming Unit. < 1 is considered as absent

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For and behalf of Lonestar Alpha Laboratories Muscat

*** End of the test report ***

Asad Naqvi
Chemistry & Microbiology Manager

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TEST CERTIFICATE - ANALYSIS OF WATER

Report No.	LMCHE - 24-1153/2	**Date Reported**	27 May 2024
Cust Ref.	-	**Date Received**	20 May 2024

1. Information Provided By Customer

Customer	**FIVE OCEANS ENVIRONMENTAL SERVICES LLC** PO Box 660 PC 131 Sultanate of Oman
Project	M19010 TE_PDO ESIA
Sample Description	Water- Sample ID: QAWS2

Sampled By	Customer	**Sampling Date & Time**	17/05/2024
Sample Brought By	Customer	**Sampling Method**	NG

2. Information Provided By Laboratory

Date Tested	20 May 2024 ~ 27 May 2024	**Method Variation**	Nil
Test Location	MCT	**LAL Sample No.**	CHE / 2259
Remarks	None		

3. Test Results

TEST	UNIT	TEST METHOD	MDL	RESULTS
Chemical Tests				
pH value @ 25°C	Units	APHA 4500 H+B	0.1	8.4
* Alkalinity as CaCO3	mg/L	APHA 2320 B	1	111
Bicarbonates	mg/L	APHA 2320 B	1	66
Calcium	mg/L	APHA 3500 Ca B	1	2329
Calcium Hardness	mg/L	APHA 3500 Ca B	1	5812
Carbonates	mg/L	APHA 2320 B	1	34
Chlorides	mg/L	APHA 4500 Cl-B	1	27585
Conductivity	mS/cm	APHA 2510 B	0.1	98.4
* Copper	mg/L	APHA 3120 B	0.02	<0.02
Fluoride	mg/L	HACH 8029	0.01	6.90
* Iron	mg/L	APHA 3120 B	0.02	<0.02
Magnesium	mg/L	APHA 3500 Mg B	1	1316
Magnesium Hardness	mg/L	APHA 3500 Mg B	1	5418
* Manganese	mg/L	APHA 3120 B	0.02	<0.02
* Potassium	mg/L	APHA 3120 B	0.2	283.8
* Sodium	mg/L	APHA 3120 B	0.2	17310.9
Sulphate	mg/L	APHA 4500 SO_4^{2-}-C	1	6363
* Total Dissolved Solids	mg/L	APHA 2540 C	5	55280
* Total Hardness	mg/L	APHA 2340 C	1	11229
* Zinc	mg/L	APHA 3120 B	0.1	<0.1

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Report No.	LMCHE - 24-1153/2	Date Reported	27 May 2024
Cust Ref.	-	Date Received	20 May 2024

TEST	UNIT	TEST METHOD	MDL	RESULTS
Nitrate	mg/L	HACH 8171	0.1	32.2
Microbiological Tests				
Escherichia coli	CFU/100mL	APHA 9222 G	1	<1
* Total coliforms	CFU/100mL	APHA 9222 B	1	<1

* This parameter is under the scope of accreditation

MDL = Method Detection Limit, APHA = American Public Health Association, Standard Methods 24th Edition. CFU = Colony Forming Unit. < 1 is considered as absent

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TEST CERTIFICATE - ANALYSIS OF WATER

Report No.	LMCHE - 24-1153/3	**Date Reported**	27 May 2024
Cust Ref.	-	**Date Received**	20 May 2024

1. Information Provided By Customer

Customer	**FIVE OCEANS ENVIRONMENTAL SERVICES LLC** PO Box 660 PC 131 Sultanate of Oman
Project	M19010 TE_PDO ESIA
Sample Description	Water- Sample ID: QAWS3

Sampled By	Customer	**Sampling Date & Time**	17/05/2024
Sample Brought By	Customer	**Sampling Method**	NG

2. Information Provided By Laboratory

Date Tested	20 May 2024 ~ 27 May 2024	**Method Variation**	Nil
Test Location	MCT	**LAL Sample No.**	CHE / 2260
Remarks	None		

3. Test Results

TEST	UNIT	TEST METHOD	MDL	RESULTS
Chemical Tests				
pH value @ 25°C	Units	APHA 4500 H+B	0.1	8.1
* Alkalinity as CaCO3	mg/L	APHA 2320 B	1	56
Bicarbonates	mg/L	APHA 2320 B	1	69
Calcium	mg/L	APHA 3500 Ca B	1	188
Calcium Hardness	mg/L	APHA 3500 Ca B	1	469
Carbonates	mg/L	APHA 2320 B	1	<1
Chlorides	mg/L	APHA 4500 CI-B	1	258
Conductivity	µS/cm	APHA 2510 B	0.1	2089
* Copper	mg/L	APHA 3120 B	0.02	<0.02
Fluoride	mg/L	HACH 8029	0.01	0.50
* Iron	mg/L	APHA 3120 B	0.02	<0.02
Magnesium	mg/L	APHA 3500 Mg B	1	21
Magnesium Hardness	mg/L	APHA 3500 Mg B	1	87
* Manganese	mg/L	APHA 3120 B	0.02	<0.02
* Potassium	mg/L	APHA 3120 B	0.2	4.39
* Sodium	mg/L	APHA 3120 B	0.2	173.1
Sulphate	mg/L	APHA 4500 SO_4^{2-}-C	1	572
* Total Dissolved Solids	mg/L	APHA 2540 C	5	1260
* Total Hardness	mg/L	APHA 2340 C	1	555
* Zinc	mg/L	APHA 3120 B	0.1	<0.1

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Report No.	LMCHE - 24-1153/3	**Date Reported**	27 May 2024
Cust Ref.	-	**Date Received**	20 May 2024

TEST	UNIT	TEST METHOD	MDL	RESULTS
Nitrate	mg/L	HACH 8171	0.1	0.9
Microbiological Tests				
Escherichia coli	CFU/100mL	APHA 9222 G	1	<1
* Total coliforms	CFU/100mL	APHA 9222 B	1	$1.7x10^2$

* This parameter is under the scope of accreditation

MDL = Method Detection Limit, APHA = American Public Health Association, Standard Methods 24th Edition. CFU = Colony Forming Unit. < 1 is considered as absent

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APPENDIX H SCREENING CRITICAL HABITAT ASSESSMENT (CHA)

DOCUMENT DETAILS

DOCUMENT TITLE	North Oman Solar PV Project
DOCUMENT SUBTITLE	Appendix H: Critical Habitat Assessment Screening Study
PROJECT NUMBER	0733953
DATE	18 October 2024
VERSION	Final 01
AUTHOR	ERM and 5OES
CLIENT NAME	TTE & OQAE

DOCUMENT HISTORY

				ERM APPROVAL TO ISSUE		
VERSION	REVISION	AUTHOR	REVIEWED BY	NAME	DATE	COMMENTS
Draft	01	5OES	Owen Davies	Cristina Ortuño	05.09.2024	Draft to Client
Draft	02	5OES	Owen Davies	Cristina Ortuño	11.10.2024	Addressing comments by the Client to Rev 01
Final	01	5OES	Owen Davies	Cristina Ortuño	18.10.2024	Final to client

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ACRONYMS AND ABBREVIATIONS

Name	Description
AOI	Area of Interest
AZE	Alliance for Zero Extinction
CHA	Critical Habitat Assessment
CHS	Critical Habitat Screening
CR	Critically Endangered
DD	Data Deficient
EAAA	Ecologically Appropriate Area of Analysis
EBSA	Ecologically or Biologically Significant Marine Areas
EIA	Environmental Impact Assessment
EN	Endangered
ESHIA	Environmental, Social and Health Impact Assessment
ESIA	Environmental and Social Impact Assessment
GN6	IFC Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
HSSE & SP	Health, Safety, Security, Environment and Social Performance
IBA	Important Bird Area
IBAT	Integrated Biodiversity Assessment Tool
ICBP	International Centre for Birds of Prey
IFC	International Financial Corporation
IPA	Important Plant Area
IUCN	International Union for Conservation of Nature
LC	Least Concern
NE	Not evaluated
NGO	Non-governmental Organization
NT	Near Threaten
PS6	Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
SBIZ	Special Botanical Interest Zone
UNEP	United Nations Environmental Programme
VU	Vulnerable
WCMC	World Conservation Monitoring Centre

1. BACKGROUND

The purpose of this document is to conduct a Screening for Critical Habitats for the North Oman Solar PV Project.

The document draws upon data provided by the Integrated Biodiversity Assessment Tool (IBAT) Report obtained in 2024. This analysis is supplemented by primary data collected during field surveys and secondary information gathered during the baseline assessment as presented in the ESIA Report.

2. DEFINITIONS AND CRITERIA

The definitions and criteria employed in this assessment adhere to those stipulated in IFC Performance Standard 6 (IFC, 2012), complemented by its corresponding guidance note (IFC, 2019).

In alignment with IFC Performance Standard 6, habitats are defined as *terrestrial, freshwater, or marine geographical unit or airway that supports assemblages of living organisms and their interactions with the non-living environment. For the purposes of implementation of this Performance Standard, habitats are divided into modified, natural, and critical. Critical habitats are a subset of modified or natural habitats* (IFC, 2012).

Expanding upon each habitat, they are defined as follows:

- **Natural Habitats** are *areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition* (IFC, 2012).
- **Modified Habitats** are *areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition. Modified habitats may include areas managed for agriculture, forest plantations, reclaimed coastal zones, and reclaimed wetlands* (IFC, 2012).
- **Critical Habitats** are *areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes* (IFC, 2012).

When referring to Critical Habitats, the term *values* is identified as *critical habitat criteria*, which are as follows (IFC, 2019; 2012):

- **Criterion 1**: Critically Endangered (CR) and/or Endangered (EN) species.
- **Criterion 2**: Endemic or restricted-range species.
- **Criterion 3**: Migratory or congregatory species.
- **Criterion 4**: Highly threatened and/or unique ecosystems.
- **Criterion 5**: Key evolutionary processes.

Detailed guidance for each criterion is available in the Guidance Notes for Performance Standard 6 (IFC, 2019). This guidance has been compiled and condensed into the accompanying table (Table 1 – Criteria Definition and Thresholds for Critical Habitat DeterminationTable 1) for easy reference.

TABLE 1 – CRITERIA DEFINITION AND THRESHOLDS FOR CRITICAL HABITAT DETERMINATION

CRITERIA	OVERVIEW	THRESHOLD
Criterion 1: Critically Endangered (CR) or Endangered (EN) Species	*Species threatened with global extinction and listed as CR and EN on the IUCN Red List of Threatened Species shall be considered as part of Criterion 1. Critically Endangered species face an extremely high risk of extinction in the wild. Endangered species face a very high risk of extinction in the wild* (GN70; IFC, 2019). *Special consideration should be given to great apes (gorillas, orangutans, chimpanzees and bonobos) due to their anthropological significance. Where great apes may potentially occur, GN17 the IUCN/Species Survival Commission (SSC) Primate Specialist Group (PSG) Section on Great Apes (SGA) must be consulted as early as possible to assist in the determination of the occurrence of great apes in the project's area of influence* (GN73; IFC 2019).	**Thresholds are:** **(a)** *Areas that support globally important concentrations of an IUCN Red-listed EN or CR species (≥ 0.5% of the global population AND ≥ 5 reproductive units (1) of a CR or EN species);* **(b)** *Areas that support globally important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in GN72(a);* **(c)** *As appropriate, areas containing important concentrations of a nationally or regionally listed EN or CR species* (GN72; IFC, 2019).
Criterion 2: Endemic and Restricted Range Species	*For purposes of this Guidance Note, the term endemic is defined as restricted range. Restricted range refers to a limited extent of occurrence (EOO).* • *For terrestrial vertebrates and plants, restricted-range species are defined as those species that have an EOO less than 50,000 square kilometers (km^2);* • *For marine systems, restricted-range species are provisionally being considered those with an EOO of less than 100,000 km^2;* • *For coastal, riverine, and other aquatic species in habitats that do not exceed 200 km width at any point (for example, rivers), restricted range is defined as having a global range of less than or equal to 500 km linear geographic span (i.e., the distance between occupied locations furthest apart)* (GN74; IFC, 2019).	**Thresholds are:** **a)** *Areas that regularly hold ≥10% of the global population size AND ≥10 reproductive units of a species* (GN75; IFC, 2019).

(1) The IUCN Biodiversity Areas standard uses the following definition for reproductive unit: "the minimum number and combination of mature individuals necessary to trigger a successful reproductive event at a site. Examples of five reproductive units include five pairs, five reproducing females in one harem, and five reproductive individuals of a plant species." Eisenberg, 1977. The Evolution of the Reproductive Unit in the Class Mammalia.

CRITERIA	OVERVIEW	THRESHOLD
Criterion 3: Migratory and Congregatory Species	*Migratory species are defined as any species of which a significant proportion of its members cyclically and predictably move from one geographical area to another (including within the same ecosystem)* (GN76; IFC, 2019). *Congregatory species are defined as species whose individuals gather in large groups on a cyclical or otherwise regular and/or predictable basis. Examples include the following:* • *Species that form colonies.* • *Species that form colonies for breeding purposes and/or where large numbers of individuals of a species gather at the same time for non-breeding purposes (for example, foraging and roosting).* • *Species that utilize a bottleneck site where significant numbers of individuals of a species occur in a concentrated period of time (for example, for migration).* • *Species with large but clumped distributions where a large number of individuals may be concentrated in a single or a few sites while the rest of the species is largely dispersed (for example, wildebeest distributions).* • *Source populations where certain sites hold populations of species that make an inordinate contribution to recruitment of the species elsewhere (especially important for marine species)* (GN77; IFC, 2019).	**Thresholds are:** **(a)** *Areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle;* **(b)** *Areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress* (GN78; IFC, 2019).
Criterion 4: Highly Threatened or Unique Ecosystems	*The IUCN is developing a Red List of Ecosystems, following an approach similar to the Red List for Threatened Species. The client should use the Red List of Ecosystems where formal IUCN assessments have been performed. Where formal IUCN assessments have not been performed, the client may use assessments using systematic methods at the national/regional level, carried out by governmental bodies, recognized academic institutions and/or other relevant qualified organizations (including internationally recognized NGOs)* (GN79; IFC, 2019).	**Thresholds are:** **a)** *Areas representing ≥5% of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN;* **b)** *Other areas not yet assessed by IUCN but determined to be of high priority for conservation by regional or national systematic conservation planning* (GN80; IFC, 2019).

CRITERIA	OVERVIEW	THRESHOLD
Criterion 5: Key Evolutionary Processes	*The structural attributes of a region, such as its topography, geology, soil, temperature, and vegetation, and combinations of these variables, can influence the evolutionary processes that give rise to regional configurations of species and ecological properties. In some cases, spatial features that are unique or idiosyncratic of the landscape have been associated with genetically unique populations or subpopulations of plant and animal species. Physical or spatial features have been described as surrogates or spatial catalysts for evolutionary and ecological processes, and such features are often associated with species diversification. Maintaining these key evolutionary processes inherent in a landscape as well as the resulting species (or subpopulations of species) has become a major focus of biodiversity conservation in recent decades, particularly the conservation of genetic diversity. By conserving species diversity within a landscape, the processes that drive speciation, as well as the genetic diversity within species, ensures the evolutionary flexibility in a system, which is especially important in a rapidly changing climate* (GN81; IFC, 2019). *For illustrative purposes, some potential examples of spatial features associated with evolutionary processes are as follows:* • *Landscapes with high spatial heterogeneity are a driving force in speciation, as species are naturally selected based on their ability to adapt and diversify;* • *Environmental gradients, also known as ecotones, produce transitional habitat, which has been associated with the process of speciation and high species and genetic diversity;* • *Edaphic interfaces are specific juxtapositions of soil types (for example, serpentine outcrops, limestone, and gypsum deposits), which have led to the formation of unique plant communities characterized by both rarity and endemism;* • *Connectivity between habitats (for example, biological corridors) ensures species migration and gene flow, which is especially important in fragmented habitats and for the conservation of metapopulations. This also includes biological corridors across altitudinal and climatic gradients and from "crest to coast";* • *Sites of demonstrated importance to climate change adaptation for either species or ecosystems are also included within this criterion* (GN82; IFC, 2019).	**Thresholds are:** *The significance of structural attributes in a landscape that may influence evolutionary processes will be determined on a case-by-case basis, and the determination of critical habitat will be heavily reliant on scientific knowledge. In the majority of cases, this criterion will apply in areas that have been previously investigated and that are already known or suspected to be associated with unique evolutionary processes. While systematic methods to measure and prioritize evolutionary processes in a landscape do exist, they are typically beyond a reasonable expectation of assessments conducted by the private sector* (GN83; IFC, 2019).

In the context of critical habitat, another important definition to establish is that of the Ecologically Appropriate Area of Analysis (EAAA). Specifically, the project should *identify an ecologically appropriate area of analysis to determine the presence of critical habitat for each species with regular occurrence in the project's area of influence, or ecosystem, covered by Criteria 1-4* (GN59; IFC, 2019).

Furthermore, the following aspects are taken into consideration:

- *The client should define the boundaries of this area taking into account the distribution of species or ecosystems (within and sometimes extending beyond the project's area of influence) and the ecological patterns, processes, features, and functions that are necessary for maintaining them. These boundaries may include catchments, large rivers, or geological features;*
- *The client will use this area of analysis to assess applicability of the critical habitat criteria and thresholds (see paragraphs GN70–GN83 of this note) to determine critical habitat for the species and/or ecosystems concerned. Critical habitats boundaries should be equivalent in scale to areas mapped for practical site-based conservation management activities;*
- *For some wide-ranging species, critical habitat may be informed by areas of aggregation, recruitment, or other specific habitat features of importance to the species. In all cases, the critical habitat should consider the distribution and connectivity of such features in the landscape/seascape and the ecological processes that support them;*
- *Where it can be shown that multiple values have largely overlapping ecological requirements and distributions, a common or aggregated area of critical habitat may be appropriate;*
- *The final area(s) of critical habitat against which project impacts will be assessed should be revised based on additional knowledge documented through field work and other assessment after the initial critical habitat assessment has been conducted* (GN59; IFC, 2019).

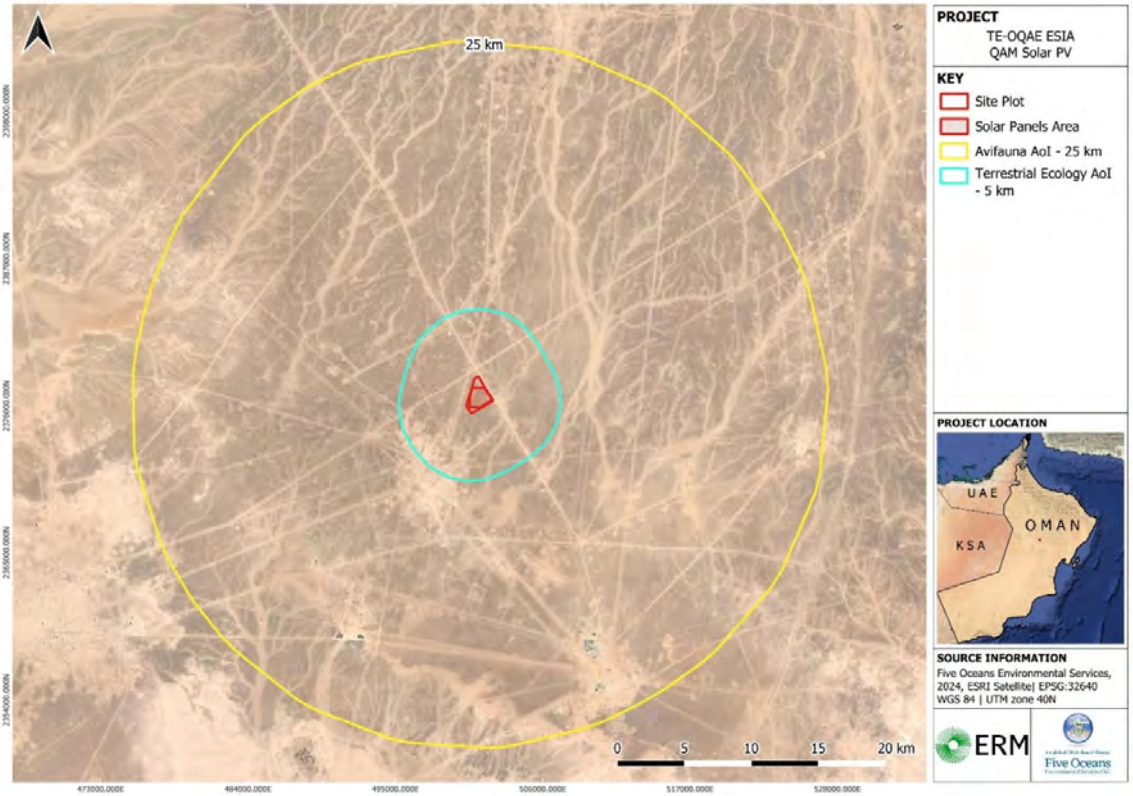
3. DESCRIPTION OF THE AOI AND EAAA

3.1 PROJECT AREA OF INFLUENCE (AOI)

For the purposes of the CHA screening study, the project involves the development of an onshore solar PV farm with an installed capacity of 105 MW. The area of influence (AOI) for birds and bats is 25 km from the project boundary, while the area of influence for terrestrial habitats (including plants and species that depend on these habitats) is 5 km from the project boundary.

The CHA Screening study considers the solar PV farm project only, and if more detailed CHA assessment is found to be necessary by the screening study, facilities such as the overhead as well as underground lines and associated sub-stations required to evacuate power from the facilities to PDO's (the off-taker) will be included in subsequent analysis. Figure 1 presents the location of the project.

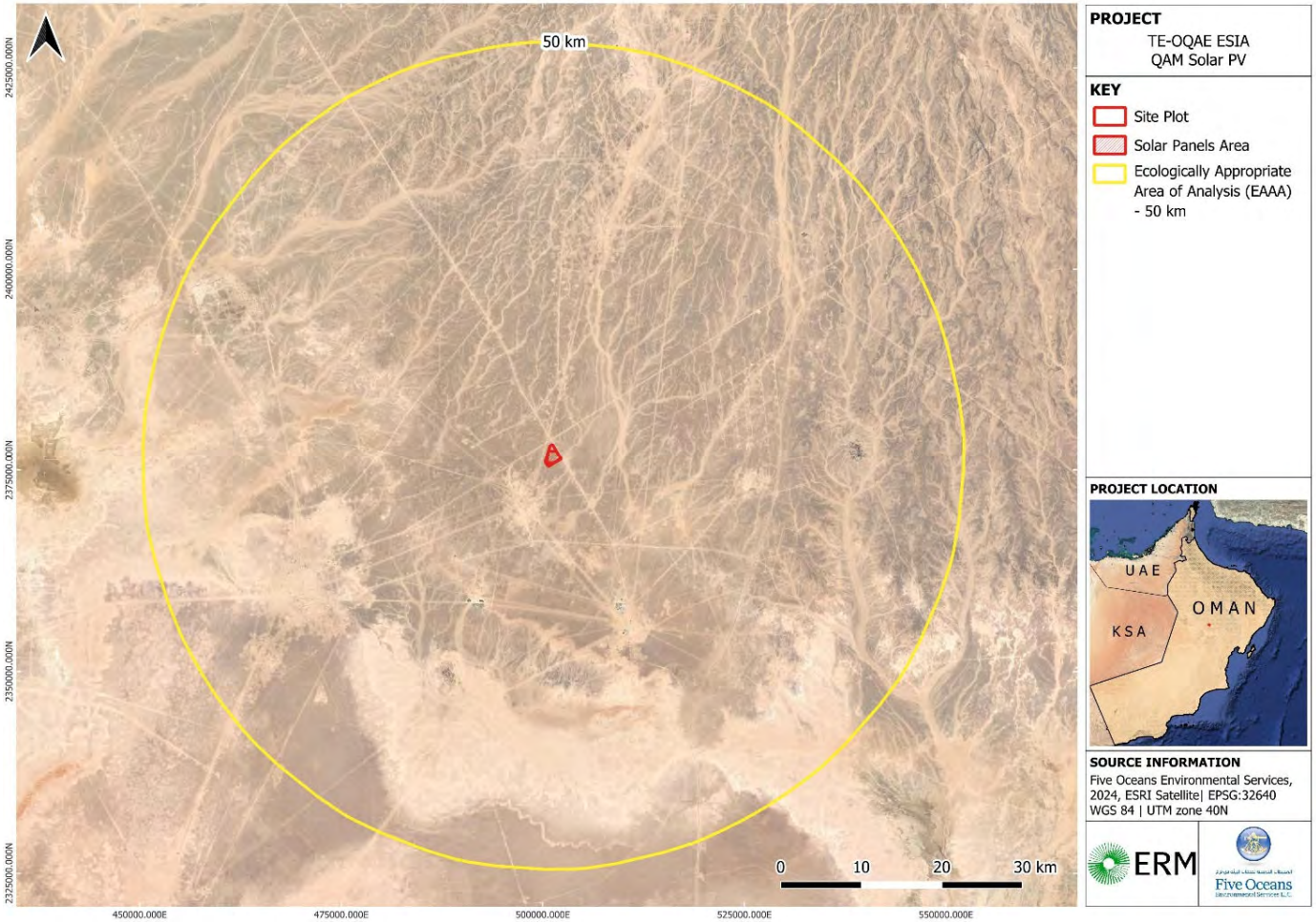
FIGURE 1 – PROJECT LOCATION AND ECOLOGY AOI (5 KM AND 35 KM)



3.2 ECOLOGICALLY APPROPRIATE AREA OF ANALYSIS (EAAA)

The Integrated Biodiversity Assessment Tool (IBAT, 2024) has identified the presence of priority species and biodiversity features such as protected areas and key biodiversity areas (IBA and AZE Areas) occurring in the terrestrial domain. An EAAA of 50 km from the project boundaries has therefore been adopted for terrestrial (including bird and bat) species for the purposes of critical habitat assessment. The EAAA covers an area of 7,853 km^2 and its boundary is shown in Figure 2.

FIGURE 2 – ECOLOGICALLY APPROPORATE AREA OF ANALYSIS (EAAA)



4. SPECIES AND HABITAT EVALUATION

The following chapters list the species identified by the Integrated Biodiversity Assessment Tool (IBAT, 2024) and those that have been identified by the baseline chapters in the ESIA (Rev B; ERM, 2024). The baseline description of terrestrial ecology has been derived from a desktop review of available information and field surveys conducted in May and June 2024.

The Integrated Biodiversity Assessment Tool identifies species within a 50 km buffer (IBAT, 2024) from the proposed solar farm. The Bird and Bat AOI that has been applied for the purpose of impact assessment for these groups for project is 25 km, whereas the AOI for terrestrial ecology (habitats and species) is 5 km from the project boundaries. To accomplish this, established databases such as IUCN[1], GBIF[2], AmphibiaWeb[3], eBird[4], Plants of the World[5], together with pertinent literature, were utilised.

The findings of the CHA screening study are summarised in Chapter 5.

4.1 CRITERION 1: PRESENCE OF CRITICALLY ENDANGERED (CR) OR ENDANGERED (EN) SPECIES

The Integrated Biodiversity Assessment Tool (IBAT, 2024) highlighted the potential presence of 4 species classified as Endangered (EN). Further analysis of existing information and field work surveys resulted in the development of a more extensive list of threatened species that is reflected in Table 2. The likelihood of each species occurring in the AOI (for birds and bats 25 km, and for terrestrial ecology 5 km, around proposed solar farm) has been informed by Eriksen & Victor (2013) for birds, and Patzelt (2015) for plants, together with observations made during site surveys.

No accurate population estimates are available for CR or EN species in Oman and therefore the ratio of the proportion of the EOO and the global distribution has been used as a proxy to estimate if the AOI may contain 0.5% or more of their global population. The Bird and Bat AOI for both projects (25 km from the project boundary) cover an area of 2,137.595 km^2, while the terrestrial habitat AOI for project is 118.626 km^2.

Four species with a status of EN, as assessed at either global or Arabian regional scale, have been identified as candidate triggers for Criterion 1. The bird and bat AOI is expected not to contain 0.5% of the global population of any of the four bird species as these species have extensive global distributions. The species that are likely to occur, and the reasons that they do not trigger Criterion 1 are:

- **Egyptian Vulture** *Neophron percnopterus:* this species is known to breed in the Hajar Mountains and on Masirah Island. The population consists of a resident

[1] https://www.iucnredlist.org/ Last accessed on 28-08-2024
[2] https://www.gbif.org/ Last accessed on 29-08-2024.
[4] https://amphibiaweb.org/ Last accessed on 29-08-2024.
[5] https://ebird.org/home Last accessed on 03-09-2024
[6] https://powo.science.kew.org/. Last accessed on 29-08-2024.

breeding population and a migratory passage population, of which only members of the migratory population are expected to occur passing through the NOS AOI during the autumn and spring seasons. The breeding range of the Egyptian Vulture includes large areas of India, western Saudi Arabia and much of the Sahel in Africa, while its non-breeding range includes large areas of central Asia, Turkey and Iran. The global population is estimated to be 12,400 – 36,000 mature individuals, indicating that the 0.5% population threshold would be 62 – 180 birds. Expert opinion indicates that a few Egyptian Vulture (less than 10) may migrate through the NOS AOI in autumn (November) when the passage of raptors is at its peak, well below the trigger threshold.

- **Lappet-Faced Vulture** *Torgos tracheliotos***.** Oman lies at the northeastern limit of the Lappet-faced Vulture's range, the core of which extends across the Sahel in northern Africa, East Africa (from Sudan to Mozambique) and across southern Africa (Namibia, Botswana and Mozambique). In Oman Lappet-Faced Vultures breed in the Hajar Mountains in Northern Oman and the mountains of Dhofar in the south, with a non-breeding population in the Empty Quarter (i.e. to the west of the NOS site) connecting these two areas. The global population is estimated to be 6500 mature birds, indicating that the population threshold that would trigger Criterion 1 is 32 – 33 mature birds. Expert opinion indicates that up to 5 birds may pass through the site while migrating or foraging during any one month (most likely to occur in November at the peak of the raptor migration), which is well below the threshold figure.
- **Steppe Eagle** *Aquila nipalensis*. This species is a passage migrant, and the population that migrates through Oman have been shown through satellite tracking to breed in central Asia (Khazakstan). The Steppe Eagle's breeding range extends to Mongolia, with non-breeding populations in India, Myanmar, Southern China, Central Saudi Arabia and Northeastern, Eastern and Southern Africa. Its range is therefore very extensive, and the global population estimate is 50,000 – 75,000 mature individuals. The 0.5% population threshold is therefore 250 – 375. The migratory pathway between Khazakstan and Oman has three main corridors, the smallest of which is a path that connects the North of Oman to the mountains in Dhofar which may take birds through the project AOI, while other routes (e.g. along the Hijaz Mountains inland from the KSA Red Sea, and north through the Empty Quarter) do not intersect with the AOI. It is therefore estimated that conservatively 10 – 20 Steppe Eagles may pass through the NOS AOI during the Autmn migration season, which does not trigger the Criterion 1 population threshold.
- **Saker Falcon** *Falco cherrug.* This species has not been observed in the NOS AOI and is therefore not confirmed to be present. The global range of this species is extensive with resident and breeding populations from North Africa (from Mauritania to Egypt and Sudan), Eastern Europe, central Asia to China, Northern India, Pakistan, Iran and Arabia. The global population is estimated to be in the range of 12,500 – 29,800 mature individuals, so the 0.5% population threshold is 62 – 149 birds. Saker falcons are rarely observed in Oman with a total of 130 observations in the Oman Bird Records Committee database which contains a total

of 270,000 bird records (Eriksen et al, 2003). Records show that Saker Falcons are generally observed as a single bird, with a maximum of two birds being observed at Ra’s Sawadi in 1995 (Eriksen et al, 2003). The number of Saker Falcon likely to be observed within the NOS AOI is therefore low, estimated to be 1 – 2 birds in a month, which is below the threshold for Criterion 1.

No additional floral or faunal species classified as Critically Endangered (CR) or Endangered (EN) were observed during the field survey conducted within the project area and its Area of Influence (AOI).

TABLE 2 – CANDIDATE TRIGGER SPECIES FOR CRITERION 1 FOR NORTH OMAN SOLAR PROJECT

	Species	IUCN CATEGORY	Regional/ National IUCN	POTENTIAL TO BE LOCATED WITHIN AOI		ONSITE OCCURRENCE	CRITERION TRIGGER ASSESSMENT
				OVERVIEW	PROBABILITY OF OCCURRENCE	OBSERVED / NO DATA	
Animals	**Aves**						
	Egyptian Vulture *Neophron percnopterus*	EN	VU (A2ae)	The geographic range as a passage migrant overlaps with the AOI.	Likely. NOS is within foraging range of resident populations in Hajar Mountains.	No Data	Does not Trigger
	Lappet-faced Vulture *Torgos tracheliotos*	EN	VU (D1)	The geographic range does not overlap with the AOI.	Very unlikely. Breeding populations occur in the Hajar Mountains and Dhofar Mountains, and migration between them is most common over the empty quarter, around 100 km to the west of the NOS site	No Data	Does not Trigger
	Steppe Eagle *Aquila nipalensis*	EN	-	The geographic range as a passage migrant overlaps with the AOI	Likely. One of the three migration routes for Steppe Eagles crosses the desert plains of central Oman where NOS is located. Occurrence is most likely in November during the peak of the Raptor migration season.	No Data	Does not Trigger
	Saker Falcon *Falco cherrug*	EN	CR	The geographic range as a passage migrant overlaps with the AOI.	Very unlikely. Saker Falcons are rarely observed in Oman, with only 130 observations since records began. Birds are observed singly, and rarely as pairs.	No Data	Does not Trigger

4.2 CRITERION 2: PRESENCE OF RESTRICTED RANGE SPECIES

The Integrated Biodiversity Assessment Tool (IBAT, 2024) outlined the potential presence of seven restricted range species. The threshold for determining candidate restricted range endemic plant species is an extent of occurrence of less than 50,000 km^2, while the threshold for triggering criterion 2 is that areas regularly hold more than or equal to 10% of the global population size and more than or equal to 10 reproductive units. The project area and its AOI does not have any range restricted species and therefore Criterion 2 is not triggered.

4.3 CRITERION 3: MIGRATORY OR CONGREGATORY SPECIES

The Integrated Biodiversity Assessment Tool (IBAT, 2024) outlined the potential presence of 89 migratory or congregatory species, of which 87 are birds, and two are insects. Please note that the data only considers species classified as "full migrant" or "altitudinal migrant", with other designations such as "nomadic," "not a migrant," "unknown," and "blank" excluded.

Table A1 (See Appendix A) has been developed by combining the list of migratory species identified in the IBAT supporting dataset with the list of species that has been developed through desktop review of information available from the projects' AOI conducted as part of the environmental baseline study. Other species listed in IBAT (2024) as migratory are recognised as resident species (e.g., Crested Lark, Spotted Sandgrouse, Laughing Dove), and have therefore been removed from the list of species assessed under Criterion 3.

Table A1 presents the species and their occurrence within the AOI. The probability of occurrence in the AOI is scored as likely if the global distribution for breeding and passage migrants coincides with the EAAA, and unlikely or improbable if the global distribution is within 50 km of the EAAA boundary. Examples of species that fall into the latter category include gulls and terns, which are coastal or sea birds.

While the list of migratory species that may occur on site is long, none are congregatory, and most are passage migrants. In all cases at no time would one percent or more of the global population be present on site.

Whether the population threshold for Criterion 3 is triggered or not, and what level of certainty can be attributed to the finding, requires some discussion.

- **The temporal aspect** of the threshold needs to be defined: the assessment should consider if 1% of the global population passes through the project AOI during a migration cycle (i.e. autumn and spring migration).
- **The spatial aspect** i.e. the relative size of the projects' AOI compared to the migration front i.e. the width of the East Asia-East Africa flyway. The width of the whole flyway extends from the Lavant/Northern Arabia to the northern Arabian Sea. The flyway is defined by the sum of migratory routes that different species use and different populations use, so there are specific paths within the flyway, so the proportion of the flyway that is occupied by the project AOI is not a precise enough metric to estimate the proportion of migratory species that may be at risk or be influenced by the development.

- **Certainty.** Ecological processes are by their nature stochastic/variable with variations evident at a range of temporal and spatial scales, so there are inherent fluctuations in the system. Coupled with this source of uncertainty is that arising from lack of information and data about the ecology of the AOI and the site.

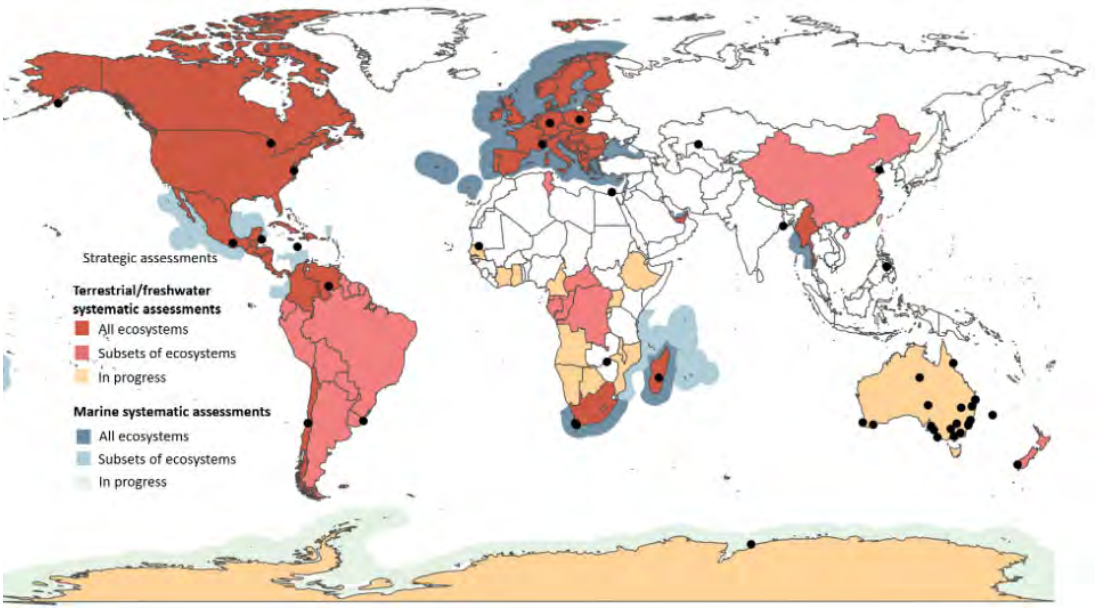
Each of these factors contribute to the level of certainty to which can be assigned to the assessment's findings. In the absence of strong evidence on which to make a conclusive deduction, it is necessary to rely on expert opinion based on experience and anecdotal observations. The findings in Table A1 have a moderate level of certainty associated with them, which can be improved with additional observations on site and wider engagement with subject matter experts.

While the list of migratory species that may occur on site is long none are congregatory, and most are passage migrants. In all cases at no time would one percent or more of the global population be present on site, and therefore **Criterion 3 is not triggered**.

4.4 CRITERION 4: PRESENCE OF HIGHLY THREATENED OR UNIQUE ECOSYSTEMS

Guidance notes for PS 6 suggests employing assessments using systematic methods at the national/regional level, carried out by governmental bodies, recognized academic institutions and/or other relevant qualified organizations (including internationally recognized NGOs) (GN79; IFC, 2019). Data sources from both international NGOs and Government sources have been reviewed in this section.

FIGURE 3 - IUCN RED LIST OF ECOSYSTEMS ASSESSMENTS CONDUCTED TO DATE



Source: https://assessments.iucnrle.org accessed 1 September, 2024.

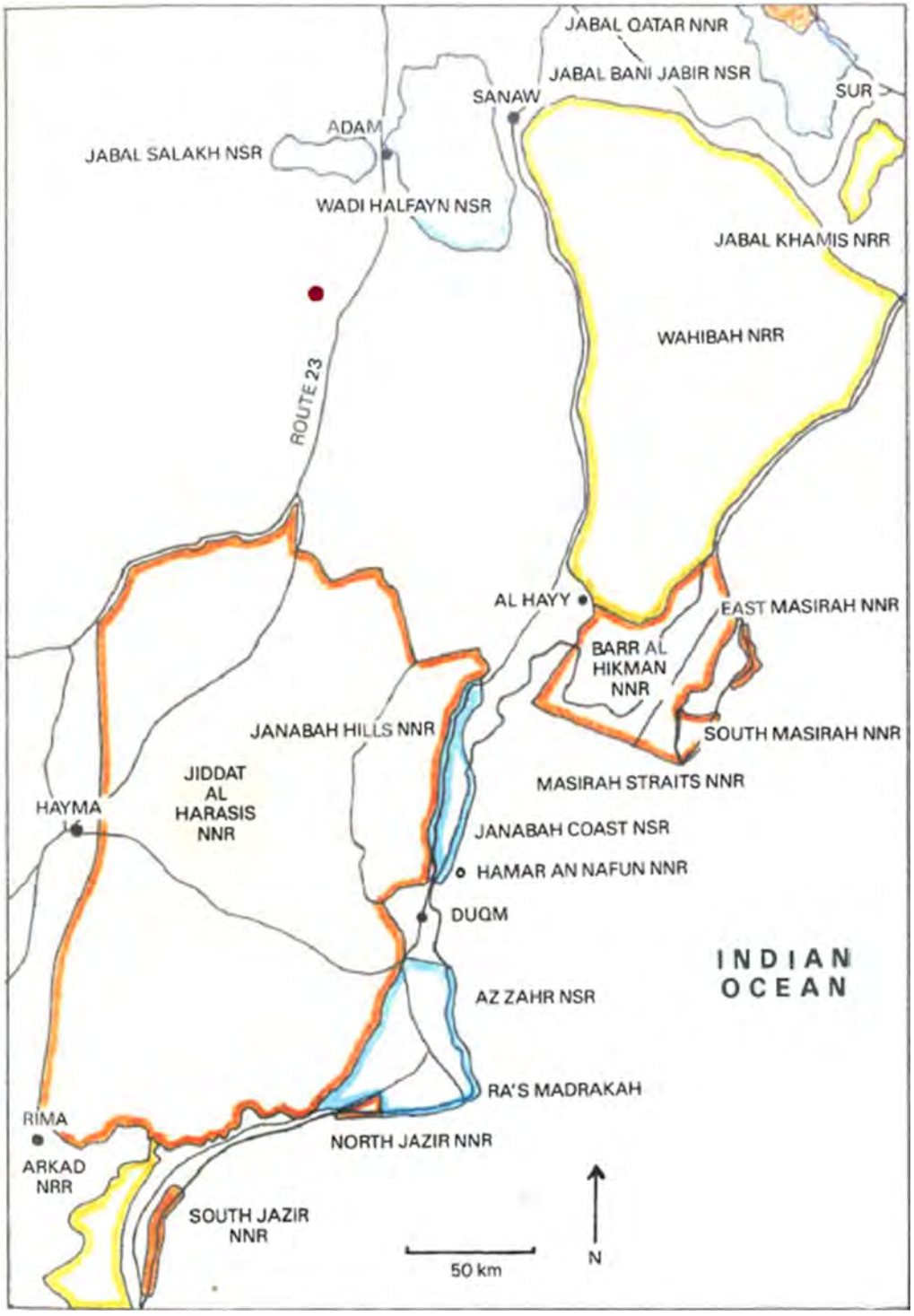
Since 2012, IUCN has been developing a global red list of ecosystems that are assessed into eight categories ranging from least concern to collapsed. However, to date no information specific to Oman is available (Figure 3).

It should be noted that there is no systematic habitat taxonomy available for Oman. Habitat mapping at masterplan and project scales in Oman have adapted habitat classification systems developed for Abu Dhabi (Brown & Boer, 2004), including solar PV project. As a result, it is not possible to determine the level of threat and uniqueness for discrete habitat types, and therefore alternative approaches are required to assess the status of this criterion with respect to the project's EAAA.

At the national scale two studies have been conducted by the government of Oman relating to biodiversity management in project region: i) a study conducted by IUCN in 1986 (IUCN, 1986), commissioned by the Diwan of the Royal Court, to develop proposals for a system of nature conservation areas in the Sultanate of Oman, and ii) the Oman National Spatial Strategy of which a regional spatial strategy (RSS) for Al Dahkliyah Governorate formed a part.

The IUCN report (1986) proposed the establishment of several National Nature Reserves (NNR) and National Scenic Reserves (NSR) in central Oman, all of which are 50 km or more from the NOS project site (Figure 4).

FIGURE 4 – PROPOSED PROTECTED AREAS IN CENTRAL OMAN (IUCN, 1986)

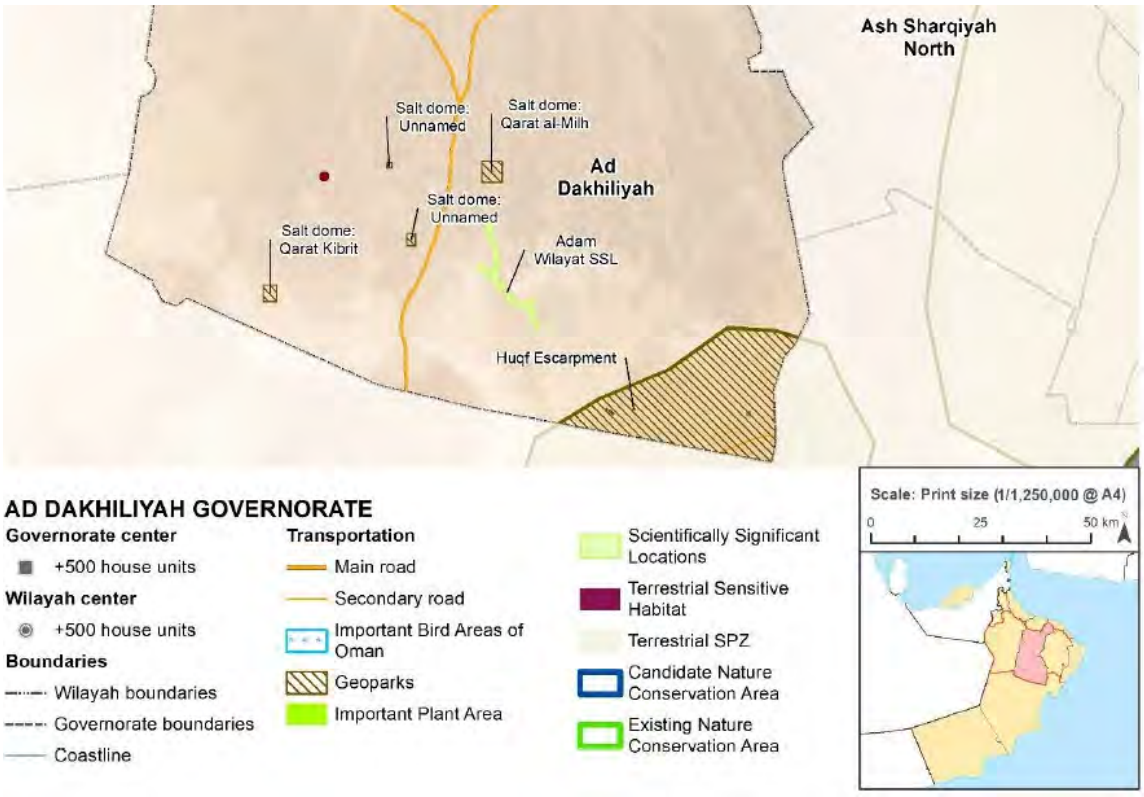


NOS project site marked with red dot. Source: IUCN (1986)

The RSS study integrated a national scale assessment of important plant areas, which found that no important plant areas (IPAs) or special botanical interest zones (SBIZ), as shown in Figure 5.

All habitats in the AOI are considered to be widespread and there are no protected areas, existing or proposed, in the AOI. **Criterion 4 is therefore not triggered.**

FIGURE 5 – SPECIAL BOTANICAL INTEREST ZONES AND IMPORTANT PLANTS AREAS IN AL DAKHALIYAH



Source: ONSS 2019

Note the project location is marked with a red dot.

4.5 CRITERION 5: KEY EVOLUTIONARY PROCESSES

As defined in the IFC PS6 Guidance Note 81, key evolution processes are *the structural attributes of a region, such as its topography, geology, soil, temperature, and vegetation, and combinations of these variables, can influence the evolutionary processes that give rise to regional configurations of species and ecological properties. In some cases, spatial features that are unique or idiosyncratic of the landscape have been associated with genetically unique populations or subpopulations of plant and animal species. Physical or spatial features have been described as surrogates or spatial catalysts for evolutionary and ecological processes, and such features are often associated with species diversification. Maintaining these key evolutionary processes inherent in a landscape as well as the resulting species (or subpopulations of species) has become a major focus of biodiversity conservation in recent decades, particularly the conservation of genetic*

diversity. By conserving species diversity within a landscape, the processes that drive speciation, as well as the genetic diversity within species, ensures the evolutionary flexibility in a system, which is especially important in a rapidly changing climate (IFC, 2019).

Some potential examples of spatial features associated with evolutionary processes include:

- *Landscapes with high spatial heterogeneity are a driving force in speciation, as species are naturally selected based on their ability to adapt and diversify;*
- *Environmental gradients, also known as ecotones, produce transitional habitat, which has been associated with the process of speciation and high species and genetic diversity;*
- *Edaphic interfaces are specific juxtapositions of soil types (for example, serpentine outcrops, limestone, and gypsum deposits), which have led to the formation of unique plant communities characterized by both rarity and endemism;*
- *Connectivity between habitats (for example, biological corridors) ensures species migration and gene flow, which is especially important in fragmented habitats and for the conservation of metapopulations. This also includes biological corridors across altitudinal and climatic gradients and from "crest to coast";*
- *Sites of demonstrated importance to climate change adaptation for either species or ecosystems are also included within this criterion (GN82; IFC, 2019).*

The significance of structural attributes in a landscape, influencing evolutionary processes, necessitates individual assessment in each case. Identifying them relies heavily on scientific understanding, typically applying to areas previously studied or suspected to be associated with unique evolutionary processes. In this case, the project does not come under any thresholds mentioned above and therefore **Criterion 5 is not triggered**.

5. PRELIMINARY IDENTIFICATION OF CRITICAL HABITAT

The findings from this screening level analysis are valuable in determining the probability of triggering critical habitat criteria.

Criteria 1 through 3 depend on populations of species as an important metric. However, as outlined in IFC PS 6 GN65, when estimates of the global population of a species and/or local population are unavailable, surrogates such as extent of occurrence (EOO) or estimates of area of occupied habitat, need to be employed to guide decision making (IFC, 2019). This is the case in this study so a population proxy has been derived from the proportion of the AOI (25 km for birds and bats, and 5 km for terrestrial habitats) and the EAAA of the concerned species.

The screening study has made the following findings:

CRITERION 01

- The initial analysis identified four bird species with a probable occurrence within the Area of Influence (AOI). These species have wide home ranges and are likely to use the project area as a migratory passage or stopover site. It is highly unlikely that the project area and AOI support ≥ 0.5% of the global population or ≥ 5 reproductive units of these species. Therefore, **Criterion 1 is not triggered.**

CRITERION 02

- The screening study has not identified any species that meet the criteria for restricted range endemic species and assessed the available information to determine if 10% of their population is expected to occur in the project's AOI therefore **Criterion 2 is not triggered**.

CRITERION 03

- Screening of IBAT data on 89 migratory species indicates that the majority of migratory species are likely to occur within the EAAA.

- The preliminary conclusion of the study is that no migratory species is expected to occur at an abundance of 1% of the global population at any one time and therefore **Criterion 3 is not triggered**.

CRITERION 04

- The screening study finds that habitats occurring within the AOI are all widespread.

- Therefore, this study concludes that **Criterion 4 is not triggered**.

CRITERION 05

- The project does not come under any thresholds therefore **Criterion 5 is not triggered**

5.1 RECOMMENDED NEXT STEPS

Based on available information obtained during desktop review of the scientific literature and observations made during field work, the study concludes that IFC PS 6 none of the criteria for critical habitat are triggered by the project's activities. It is recommended that the findings of this study are reflected in the impact assessment with respect to sensitivity of ecological receptors.

6. REFERENCES

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APPENDIX A LIST OF MIGRATORY SPECIES

TABLE A1 - MIGRATORY OR CONGREGATORY SPECIES POTENTIALLY RELEVANT FOR THE ASSESSMENT

BINOMIAL	COMMON NAME	POTENTIAL TO BE LOCATED WITHIN AOI		ONSITE OCCURENCE	CRITERION TRIGGER ASSESSMENT
		OVERVIEW	PROBABILITY OF OCCURRENCE	OBSERVED / NO DATA	
Aves					
Falco cherrug	Saker Falcon	The geographic range overlaps with the AOI. The range is classified as "extant".	Very unlikely	No Data	Does not Trigger
Limosa limosa	Black-tailed Godwit	The geographic range includes the AOI	Unlikely	No Data	Does not Trigger
Numenius arquata	Eurasian Curlew	The geographic range is limited to the shoreline and nearshore areas.	Unlikely	No Data	Does not Trigger
Apus pallidus	Pallid Swift	The geographic range overlaps with the AOI. The range is classified as "extant".	Likely	No Data	Does not Trigger
Limosa limosa	Black-tailed Godwit	The geographic range includes the AOI	Unlikely	No Data	Does not Trigger
Amaurornis phoenicurus	White-breasted Waterhen	The geographic range does not overlap with the AOI.	Very unlikely	No Data	Does not Trigger
Tringa totanus	Common Redshank	The geographic range does not overlap with the AOI.	Very unlikely	No Data	Does not Trigger
Tringa stagnatilis	Marsh Sandpiper	The geographic range does not overlap with the AOI.	Very unlikely	No Data	Does not Trigger

BINOMIAL	COMMON NAME	POTENTIAL TO BE LOCATED WITHIN AOI		ONSITE OCCURENCE	CRITERION TRIGGER ASSESSMENT
		OVERVIEW	PROBABILITY OF OCCURRENCE	OBSERVED / NO DATA	
Actitis hypoleucos	Common Sandpiper	The geographic range overlaps with the AOI. The range is classified as "extant".	Likely	No Data	Does not Trigger
Recurvirostra avosetta	Pied Avocet	The geographic range does not overlap with the AOI.	Very unlikely	No Data	Does not Trigger
Anarhynchus asiaticus	Caspian Plover	The geographic range does not overlap with the AOI.	Very unlikely	No Data	Does not Trigger
Larus fuscus	Lesser Black-backed Gull	The geographic range is limited to the shoreline and nearshore areas, and has not been recorded near project area or AOI.	Very unlikely	No Data	Does not Trigger
Chroicocephalus ridibundus	Black-headed Gull	The geographic range is limited to the shoreline and nearshore areas, and has not been recorded near project area or AOI.	Very unlikely	No Data	Does not Trigger
Pandion haliaetus	Osprey	The geographic range overlaps with AOI (passage migrant).	Likely	No Data	Does not Trigger
Luscinia svecica	Bluethroat	The geographic range overlaps with the AOI. The range is classified as "non-breeding".	Likely	No Data	Does not Trigger
Phoenicurus ochruros	Black Redstart	The geographic range overlaps with the AOI. The range is classified as "non-breeding".	Likely	No Data	Does not Trigger
Oenanthe isabellina	Isabelline Wheatear	The geographic range overlaps with the AOI. The range is classified as "non-breeding".	Likely	No Data	Does not Trigger
Curruca mystacea	Menetries's Warbler	The geographic range overlaps with the AOI. The range is classified as "passage".	Likely	No Data	Does not Trigger

BINOMIAL	COMMON NAME	POTENTIAL TO BE LOCATED WITHIN AOI		ONSITE OCCURENCE	CRITERION TRIGGER ASSESSMENT
		OVERVIEW	PROBABILITY OF OCCURRENCE	OBSERVED / NO DATA	
Anthus campestris	Tawny Pipit	The geographic range overlaps with the AOI. The range is classified as "non-breeding".	Likely	No Data	Does not Trigger
Anthus cervinus	Red-throated Pipit	The geographic range overlaps with the AOI. The range is classified as "non-breeding".	Likely	No Data	Does not Trigger
Anarhynchus alexandrinus	Kentish *Plover*	The geographic range overlaps with the AOI. The range is classified as "non-breeding".	Likely	No Data	Does not Trigger
Larus cachinnans	Caspian Gull	The geographic range does not overlap with the AOI.	Very unlikely	No Data	Does not Trigger
Falco peregrinus	Peregrine Falcon	The geographic range overlaps with the AOI. The range is classified as "passage".	Likely	No Data	Does not Trigger
Alauda arvensis	Eurasian Skylark	The geographic range overlaps with the AOI. The range is classified as "passage".	Likely	No Data	Does not Trigger
Milvus migrans	Black Kite	The geographic range overlaps with the AOI. The range is classified as "passage".	Likely	No Data	Does not Trigger
Neophron percnopterus	Egyptian Vulture	The geographic range overlaps with the AOI. The range is classified as "passage".	Likely	No Data	Does not Trigger
Clanga clanga	Greater Spotted Eagle	The geographic range overlaps with the AOI. The range is classified as "non-breeding".	Likely	No Data	Does not Trigger
Aquila heliaca	Eastern Imperial Eagle	The geographic range overlaps with the AOI. The range is classified as "passage".	Likely	No Data	Does not Trigger

BINOMIAL	COMMON NAME	POTENTIAL TO BE LOCATED WITHIN AOI		ONSITE OCCURENCE	CRITERION TRIGGER ASSESSMENT
		OVERVIEW	PROBABILITY OF OCCURRENCE	OBSERVED / NO DATA	
Circus macrourus	Pallid Harrier	The geographic range overlaps with the AOI. The range is classified as "passage".	Likely	No Data	Does not Trigger
Coracias garrulus	European Roller	The geographic range overlaps with the AOI. The AOI is classified as "non-breeding" range.	Likely	No Data	Does not Trigger
Circus pygargus	Montagu's Harrier	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Chrysococcyx caprius	Dideric Cuckoo	The geographic range does not overlap with the AOI.	Very unlikely	No Data	Does not Trigger
Gallinago gallinago	Common Snipe	The geographic range overlaps with the AOI. The AOI is classified as "non breeding" range.	Likely	No Data	Does not Trigger
Tringa glareola	Wood Sandpiper	The geographic range overlaps with the AOI. The AOI is classified as "non breeding" range.	Likely	No Data	Does not Trigger
Falco subbuteo	Eurasian Hobby	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Cercotrichas galactotes	Rufous-tailed Scrub-robin	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Saxicola torquatus	Common Stonechat	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger

BINOMIAL	COMMON NAME	POTENTIAL TO BE LOCATED WITHIN AOI		ONSITE OCCURENCE	CRITERION TRIGGER ASSESSMENT
		OVERVIEW	PROBABILITY OF OCCURRENCE	OBSERVED / NO DATA	
Ptyonoprogne obsoleta	Pale Rock Martin	The geographic range overlaps with the AOI. The AOI is classified as "extant".	Likely	No Data	Does not Trigger
Locustella fluviatilis	River Warbler	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Phylloscopus trochilus	Willow Warbler	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Motacilla alba	White Wagtail	The geographic range overlaps with AOI (passage migrant)	Likely	No Data	Does not Trigger
Motacilla cinerea	Grey Wagtail	The geographic range overlaps with AOI (passage migrant)	Likely	No Data	Does not Trigger
Circus cyaneus	Hen Harrier	The geographic range overlaps with AOI (passage migrant).	Likely	No Data	Does not Trigger
Phylloscopus nitidus	Green Warbler	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Oenanthe chrysopygia	Red-tailed Wheatear	The geographic range overlaps with the AOI. The AOI is classified as "non breeding".	Likely	No Data	Does not Trigger
Curruca curruca	Lesser Whitethroat	The geographic range overlaps with the AOI. The AOI is classified as "non breeding".	Likely	No Data	Does not Trigger
Egretta garzetta	Little Egret	The geographic range overlaps with the AOI. The AOI is classified as "non breeding".	Likely	No Data	Does not Trigger

BINOMIAL	COMMON NAME	POTENTIAL TO BE LOCATED WITHIN AOI		ONSITE OCCURENCE	CRITERION TRIGGER ASSESSMENT
		OVERVIEW	PROBABILITY OF OCCURRENCE	OBSERVED / NO DATA	
Lanius isabellinus	Isabelline Shrike	The geographic range overlaps with the AOI. The AOI is classified as "non breeding".	Likely	No Data	Does not Trigger
Lanius phoenicuroides	Red-tailed Shrike	The geographic range overlaps with the AOI. The AOI is classified as "non breeding".	Likely	No Data	Does not Trigger
Lanius excubitor	Great Gray Shrike	The geographic range overlaps with the AOI. The AOI is classified as "non breeding".	Likely	No Data	Does not Trigger
Calandrella brachydactyla	Greater Short-toed Lark	The geographic range overlaps with the AOI. The AOI is classified as "non breeding".	Likely	No Data	Does not Trigger
Motacilla flava	Western Yellow Wagtail	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Phylloscopus trochiloides	Greenish Warbler	The geographic range just within the AOI. The AOI is classified as "passage".	Unlikely	No Data	Does not Trigger
Aquila nipalensis	Steppe Eagle	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Falco concolor	Sooty Falcon	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Very unlikely	No Data	Does not Trigger
Chlamydotis macqueenii	Asian Houbara	The geographic range overlaps with the AOI. The AOI is classified as "extant".	Likely	No Data	Does not Trigger
Aquila chrysaetos	Golden Eagle	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger

BINOMIAL	COMMON NAME	POTENTIAL TO BE LOCATED WITHIN AOI		ONSITE OCCURENCE	CRITERION TRIGGER ASSESSMENT
		OVERVIEW	PROBABILITY OF OCCURRENCE	OBSERVED / NO DATA	
Pernis apivorus	European Honey-Buzzard	The geographic range just within the AOI. The AOI is classified as "passage".	Unlikely	No Data	Does not Trigger
Gyps fulvus	Griffon Vulture	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Hieraaetus pennatus	Booted Eagle	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Falco naumanni	Lesser Kestrel	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Falco tinnunculus	Common Kestrel	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Muscicapa striata	Spotted Flycatcher	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Ficedula parva	Red-breasted Flycatcher	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Phoenicurus phoenicurus	Common Redstart	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Oenanthe hispanica	Black-eared Wheatear	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Oenanthe deserti	Desert Wheatear	The geographic range overlaps with the AOI. The AOI is classified as "non-breeding".	Likely	No Data	Does not Trigger

BINOMIAL	COMMON NAME	POTENTIAL TO BE LOCATED WITHIN AOI		ONSITE OCCURENCE	CRITERION TRIGGER ASSESSMENT
		OVERVIEW	PROBABILITY OF OCCURRENCE	OBSERVED / NO DATA	
Hippolais languida	Upcher's Warbler	The geographic range overlaps with the AOI and this species has been observed on site. The AOI is classified as "passage".	Definite	No Data	Does not Trigger
Sylvia borin	Garden Warbler	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Curruca communis	Common Whitethroat	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Anthus trivialis	Tree Pipit	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Circaetus gallicus	Short-toed Snake-eagle	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Iduna pallida	Olivaceous Warbler	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Curruca crassirostris	Eastern Orphean Warbler	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Oenanthe xanthoprymna	Kurdish Wheatear	The geographic range overlaps with the AOI. The AOI is classified as "non-breeding".	Likely	No Data	Does not Trigger
Cursorius cursor	Cream-coloured Courser	The geographic range overlaps with the AOI. The AOI is classified as "breeding".	Likely	No Data	Does not Trigger
Turdus atrogularis	Black-throated Thrush	The geographic range does not overlap with the AOI.	Very unlikely	No Data	Does not Trigger

BINOMIAL	COMMON NAME	POTENTIAL TO BE LOCATED WITHIN AOI		ONSITE OCCURENCE	CRITERION TRIGGER ASSESSMENT
		OVERVIEW	PROBABILITY OF OCCURRENCE	OBSERVED / NO DATA	
Buteo rufinus	Long-legged Buzzard	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Burhinus oedicnemus	Eurasian Thick-knee	The geographic range overlaps with the AOI. The AOI is classified as "passage".	Likely	No Data	Does not Trigger
Phylloscopus collybita	Common Chiffchaff	The geographic range overlaps with the AOI. The AOI is classified as "breeding".	Likely	No Data	Does not Trigger
Phylloscopus tristis	Siberian Chiffchaff	The geographic range overlaps with the AOI. The AOI is classified as "non-breeding".	Likely	No Data	Does not Trigger
Curruca nana	Asian Desert Warbler	The geographic range overlaps with the AOI. The AOI is classified as "non-breeding".	Likely	No Data	Does not Trigger
Acrocephalus stentoreus	Clamorous Reed Warbler	The geographic range overlaps with the AOI. The AOI is classified as "non-breeding".	Likely	No Data	Does not Trigger
Insecta					
Anax ephippiger	Vagrant Emperor Dragonfly	The geographic range overlaps with the AOI. The AOI is classified as "breeding".	Likely	No Data	Does not Trigger
Vanessa cardui	Painted Lady	The geographic range overlaps with the AOI. The AOI is classified as "breeding".	Likely	No Data	Does not Trigger

APPENDIX I LANDSCAPE PHOTOMONTAGES

VP1

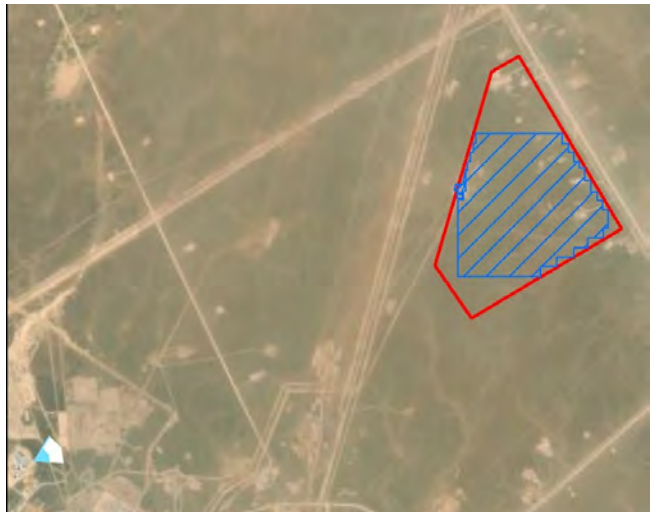
Cordinate
N 21°28'1.77"
E 56°57'40.76"

Current

Photomontage

Wireframe

Construction lines



View direction: 62 degree

Field of view (FoV): 60°

Distance from site 4.8 km

This viewpoint is located in the car park outside the camp so provides an unobstructed view of the project area.

This viewpoint is located in the car park outside the camp, the value of this view is Low.

Due the distance the magnitude is considered Negligible.

Sensitivity	Magnitude	Significance
Low	Negligible	**Not significant**

ERM

APPENDIX J EXECUTIVE SUMMARY OF THE HUMAN RIGHTS RISK ASSESSMENT (HRRA)

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LIST OF TABLES

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

Acronyms	Description
BOO	Build, own and operate
E&S	Environmental & Social
EP4	Equator Principles Version 4
ESIA	Environmental and Social Impact Assessment
GBVH	Gender-based Violence and Harassment
ha	Hectares
H3SE	Hygiene, Safety, Security, Social & Environment
HRRA	Human Rights Risk Assessment
ILO	International Labour Organization
LLC	limited liability company
OHS	Occupational Health and Safety
OHTL	Overhead Transmission Line
OQAE	OQ Alternative Energy LLC
PDO	Petroleum Development Oman
RW1	Riyah 1 Wind Farm
RW2	Riyah 2 Wind Farm
SEP	Stakeholder Engagement Plan
TTE	TotalEnergies
UNGP	United Nations Guiding Principles on Business and Human Rights
WMP	Workers Management Plan

1. INTRODUCTION

TotalEnergies Renewables Development Middle East LLC ("TTE"), together with OQ Alternative Energy LLC ("OQAE"), (both being the "Projects Proponent" or the "Project Company"), are planning to develop three PDO renewable energy projects (hereafter 'the Projects' or 'the Project' to refer to it separately) in the Sultanate of Oman. These projects are:

- The North Oman Solar plant — an onshore Solar photovoltaic (PV) farm located in the northern region of Oman;
- The Riyah 1 Wind Farm (RW1) and the Riyah 2 Wind Farm (RW2), two onshore wind farms, each consisting of 18 turbines, located in the southern region of Oman.

The Projects will be connected to the grid of Petroleum Development Oman ("PDO", the "Off-taker"). The Projects' energy output will not feed energy into the national grid. The Projects will be structured together to form a standalone independent power producer (IPP) company which will be registered as a limited liability company (LLC) in Oman, and the assets will be developed on a build, own and operate (BOO) basis. The share capital of the Project Company will be owned jointly by TTE and OQAE.

The three sites fall within Block 6 concession area and are owned by the Oman Government and leased to PDO under a Concession Agreement due to expire in 2044. Under the agreement, PDO and its partners have the right to carry out activities to explore and produce oil from Block 6. Rights to use the land for the intended purpose will be transferred to the Project Proponent via usufruct agreement, the boundary of which will align with the footprint of the Project.

This non-technical summary is prepared to demonstrate compliance with Equator Principles (2020) Principle 10: Reporting and Transparency in which it requires companies to publicly disclose a summary of the ESIA and made it accessible and available online, including those from Human Rights Risk Assessments (HRRA). A HRRA was conducted to determine the levels of human rights risk associated with the PV Solar Plant, Riyah 1 Wind Farm (RW1) and Riyah 2 Wind Farm (RW2) projects. The term *human rights risks* in this context refers to the potential adverse impacts on human rights that may result from the Projects.

The EP4 represent a financial industry benchmark for determining, assessing, and managing environmental and social (E&S) risks in project financing. Under the EP4, companies are expected to conduct an initial broad-level assessment of all risks related to potential human rights impacts of their projects to determine severity risk levels and identify appropriate mitigation measures. Companies are required to incorporate results of this evaluation within the Assessment Documentation, either the Environmental and Social Impact Assessment (ESIA) or other relevant assessments. It is noteworthy that, in addition to the EP4, during the evaluation of potential and actual human rights impacts, the HRRA adhered to the principles outlined in the United Nations Guiding Principles on Business and Human Rights (UNGP) — the global standard of expected conduct for all companies wherever they operate.

This document represents the Non-Technical Summary of the HRRA and has been developed to support the process of public disclosing of results of the HRRA and the mitigation measures defined for the Project.

2. PROJECTS DESCRIPTION

This section provides a description of the proposed Projects, its key components, location, schedule, workforce projections, accommodation and security arrangements. The information presented in this section is based on the information provided by the Project Proponent available at the time of writing the HRRA report.

2.1.1 PV SOLAR PLANT PROJECT

The proposed PV Solar Plant comprises an onshore Solar photovoltaic (PV) farm with a 105 MW installed capacity and a maximum delivered capacity of 105 MWac at day. The Project site plot comprises 302 ha of land. Key project elements are summarized in Table 2-1.

TABLE 2-1 KEY PROJECT COMPONENTS – PV SOLAR PLANT

Element	Details
PV Modules, Inverters and Mounting system	• A total of 218,805 PV modules (7,545 strings x 29 In series), each with a capacity of 585 Wp. It should be noted that there is another option of using 206,460 PV modules, each with a capacity of 620 Wp; however, at this stage, the first option is the one being described across the document. • A total of 13 box-type LV-MV transformers. • Module mounting structure type will be single axis tracker. Total number of trackers will be 2,515.
External site access road (Associated facility)	• The Project site will be accessed from public paved Road 31 via a graded access road to be constructed by PDO as part of Project agreements and is outside the scope of this Project. The anticipated length of the new external access road is 1.67 km.
Internal roads (incl. peripheral roads)	• The internal road network will consist of approximately 11.2 km of newly constructed tracks. These will have a width of approximately 6 m, which includes 0.5 m shoulder on each side.
On-site electrical connections and step-up substation	• On-site medium-voltage (MV) cabling will be laid underground within the internal road corridor (where possible), linking the 13 LV-MV transformers to the 33kV switchgear in the step-up substation. • The step-up substation will be located in the west center of the Project plot. Two high-voltage (HV) transformers in the step-up substation will be used to step-up the voltage of the electricity for evacuation into PDO's grid to 132 kV.
Interface yard and overhead Transmission line (OHTL) (Associated facilities)	• An interface yard (including AIS bay and OHL tower), and an OHTL of approximately about 5 km long from the Project's step-up substation to PDO's SNDC substation will be constructed by PDO as part of Project agreements and is outside the scope of this Project.
Temporary construction compound	• A temporary construction compound of approximately 0.6 ha will be required during the construction phase of the Project, and it will comprise two areas of Temporary Site Facilities (TSF) and laydown areas. For some electrical panel and electronic equipment, a shed laydown area will be provided to protect the package from the sun rays and rain. For PV modules and mounting structures, several temporary laydown areas will be provided within the site to reduce the distance of in-site transportation.
Meteorological stations	• 5 meteorological stations evenly distributed within the boundary of the Project site will be installed.

Element	Details
Perimeter fence	• Since PV installations represent a large financial investment, a site perimeter fence will be constructed, with an approximate length of 5.6 km.

It is anticipated that the construction/commissioning phase of the PV Solar Plant will last 17 months in total, estimated to start in Q4 2024.

The Project's operation lifetime with the Project Proponent will be of 18 years after which, the Project will be handed over to PDO in year 19, as part of the Project agreements, and it is expected to continue operating for a period thereafter. The decommissioning phase will therefore become the responsibility of PDO, and it is not part of this Project's scope.

The construction of the PV Solar Plant will require approximately 500 workers at peak activity. During operation and maintenance (O&M) phase, the Project will require up to 10 full-time staff to keep the facility maintained and working.

At this stage, it is not yet defined where accommodation camps for construction or operation will be located; however, the following potential options are being managed:

- Utilization of existing PDO's contractor's camps nearby at Qarn Alam camp such as Arab Sea Line, Arab Sea Line (Saih Rawl Camp), RS PAC Qarn Alam (Tawos Motel).
- Establishing temporary camps set up by Project contractors.

One guardhouse will be constructed at the entrance of the PV plant. The Project site will be fenced during the preliminary works and 24/7 security will be installed on site as soon as the first batch of construction material is delivered. Fence will be a normal chain link fence installed around the entire project area. Approximate length of the fence is 5.6 km.

During construction, the EPC contractor will be responsible for security arrangements. Once the wind farm is in operation, throughout the O&M phase, the Project Company will provide security services.

2.1.2 RIYAH WIND 1 PROJECT

The Riyah 1 Wind Project comprises an onshore windfarm with a 117 MW installed capacity and maximum delivered capacity of 111 MW. The production will be met through the installation of 18 turbines, each with a capacity of 6.5 MW. The Project site plot comprises 445 ha of land. Key project elements are summarized in Table 2-2.

TABLE 2-2 KEY PROJECT COMPONENTS – RIYAH 1 WIND FARM

Element	Details
Wind turbine generators (WTG) and foundations	• 18 turbines, each with a capacity of 6.5 MW. • The turbines are made up of three main parts - a tower, a nacelle and the rotary blades. Each turbine will have a maximum tip height of about 200 m: a hub height of 110 m and a blade length of 90 m approximately, following turbine model GoldWind GWH-182/6.5 MW. • Each turbine will have a foundation with a diameter of approximately 23 m. • Each turbine will have a transformer to step-up the voltage from 1.14 to 33 kV.

Element	Details
Crane hardstandings and auxiliary crane areas for crane assembly and blade laydown	• A crane hardstanding will be required adjacent to each turbine location (approximately 726 m^2 or 0.0726 ha). • In addition to the main crane hardstanding area, there will be an auxiliary crane area consisting of a temporary flattened area for crane assembly and blade laydown (of approximately 0.393 ha). This area will not be formed of hardstanding. • The main crane hardstanding area and auxiliary crane area for each turbine location will be of about 0.466 ha.
External site access road (Associated facility)	• The Project site will be accessed from public paved Road 39 via a graded access road to be constructed by PDO as part of Project agreements and is outside the scope of this Project. The anticipated length of the new external site access road is 23.9 km.
Internal roads	• The internal road network will consist of approximately 13.99 km of newly constructed tracks. These will have a width of approximately 6 m, which includes 0.5 m shoulder on each side.
On-site electrical connections and step-up substation	• On-site medium-voltage (MV) cabling will be laid underground within the internal road corridor, linking the 1.14/33 kV turbine transformers to the 33kV switchgear in the step-up substation. • The step-up substation will be located in the north center of the windfarm plot. Two high-voltage (HV) transformers in the step-up substation will be used to step-up the voltage of the electricity for evacuation into PDO's grid to 132 kV.
Interface yard and overhead Transmission line (OHTL) (Associated facilities)	• An interface yard (including AIS bay and OHL tower), and an OHTL of approximately 10 km long from the Project's step-up substation to PDO's Amin-2 substation will be constructed by PDO as part of Project agreements and is outside the scope of this Project.
Temporary industrial yard	• A temporary industrial yard will be required during the construction phase of the Project, and it will comprise approximately 25.15 ha.
Met masts	• Two permanent met masts for power curve measurement test and future meteorological condition measurement will be installed. The location and height of these masts are yet to be determined but will be located within the site plot.

It is anticipated that the construction/commissioning phase of the Project will last for about 20 months in total, estimated to start in Q1 2025.

The Project's operation lifetime will be of about 18 years. After this, the Project is expected to apply for a PPA extension with the existing Off-taker or explore other potential power sale options for an additional 2 years, extending the total operational life to 20 years. Following the 20-year period, the asset's health will be thoroughly reviewed by independent consultants, if feasible, to determine if extension or refurbishment of components is necessary. Decommissioning will be considered if the structural assessment results do not meet the expected results by the experts.

The construction of the Riyah 1 wind farm will require approximately 600 workers at peak activity. During operations, the Project will require up to five full-time staff to keep the facility maintained and working (a Project Manager, a Technical Supervisor, a Warehouse Supervisor, an HSE Officer and a Schedule Maintenance Supervisor), and about 15 site engineers/technicians to be outsourced from local third parties for schedule maintenance.

2.1.3 RIYAH WIND 2 PROJECT

The Riyah 2 Wind Project comprises an onshore windfarm with a 117 MW installed capacity and maximum delivered capacity of 111 MW. The production will be met through the installation of 18 turbines, each with a capacity of 6.5 MW. The Project site plot comprises 266 ha of land. Key project components are summarized in Table 2-3.

TABLE 2-3 KEY PROJECT COMPONENTS – RIYAH 2 WIND FARM

Element	Details
Wind turbine generators (WTG) and foundations	• 18 turbines, each with a capacity of 6.5 MW. • The turbines are made up of three main parts - a tower, a nacelle and the rotary blades. Each turbine will have a maximum tip height of about 200 m: a hub height of 110 m and a blade length of 90 m approximately, following turbine model GoldWind GWH-182/6.5 MW. • Each turbine will have a foundation with a diameter of approximately 23 m. • Each turbine will have a transformer to step-up the voltage from 1.14 to 33 kV.
Crane hardstandings and auxiliary crane areas for crane assembly and blade laydown	• A crane hardstanding will be required adjacent to each turbine location (approximately 726 m^2 or 0.0726 ha). • In addition to the main crane hardstanding area, there will be an auxiliary crane area consisting of a temporary flattened area for crane assembly and blade laydown (of approximately 0.393 ha). This area will not be formed of hardstanding. • The main crane hardstanding area and auxiliary crane area for each turbine location will be of about 0.466 ha.
External site access road (Associated facility)	• The Project site will be accessed from public paved Road 39 via a graded access road to be constructed by PDO as part of Project agreements and is outside the scope of this Project. The anticipated length of the new external site access road is 18 km.
Internal roads	• The internal road network will consist of approximately 9.85 km of newly constructed tracks. These will have a width of approximately 6 m, which includes 0.5 m shoulder on each side.
On-site electrical connections and step-up substation	• On-site medium-voltage (MV) cabling will be laid underground within the internal road corridor, linking the 1.14/33 kV turbine transformers to the 33kV switchgear in the step-up substation. • The step-up substation will be in the north center of the windfarm plot. Two high-voltage (HV) transformers in the step-up substation will be used to step-up the voltage of the electricity for evacuation into PDO's grid to 132 kV.
Interface yard and overhead Transmission line (OHTL) (Associated facilities)	• An interface yard (including AIS bay and OHL tower), and an OHTL of approximately 128 km long from the Project's step-up substation to PDO's Nimr West substation will be constructed by PDO as part of Project agreements and is outside the scope of this Project.
Temporary industrial yard	• A temporary industrial yard will be required during the construction phase of the Project, and it will comprise approximately 6.28 ha, respectively
Met masts	• 2 permanent met masts for power curve measurement test and future meteorological condition measurement will be installed. The location and height of these masts are yet to be determined but will be located within the site plot.

It is anticipated that the construction/commissioning phase of the Project will last for about 20 months in total, estimated to start in Q1 2025, in parallel to the construction of the Riyah 1 Project.

The Project's operation lifetime will be of about 18 years. After this, the Project is expected to apply for a PPA extension with the existing Off-taker or explore other potential power sale options for an additional 2 years, extending the total operational life to 20 years. Following the 20-year period, the asset's health will be thoroughly reviewed by independent consultants, if feasible, to determine if extension or refurbishment of components is necessary. Decommissioning will be considered if the structural assessment results do not meet the expected results by the experts.

The construction of the Riyah 2 wind farm will require approximately 600 workers at peak activity. During operations, the Project will require up to five full-time staff to keep the facility maintained and working (a Project Manager, a Technical Supervisor, a Warehouse Supervisor, an HSE Officer and a Schedule Maintenance Supervisor), and about 15 site engineers/technicians to be outsourced from local third parties for schedule maintenance.

At this stage, the locations for accommodation camps for construction, operation, or decommissioning have not yet been determined. However, the Project Proponent is currently considering housing workers for both Riyah 1 and Riyah 2 at PDO contractor camps nearby, specifically at the Amal camp, located about 18 km southwest of the Riyah 1 site and 39.4 km from Riyah 2, and the Nimr camp, approximately 18 km from Riyah 1 and 16.8 km from Riyah 2. Alternatively, temporary camps would be set up by Project contractors to accommodate workers.

A security guard room will be deployed beside the main entrances of the Riyah 1 and Riyah 2 sites. Chain link fence will be provided around the substation with an entrance gate.

2.1.4 LOCATION OF THE PROJECTS

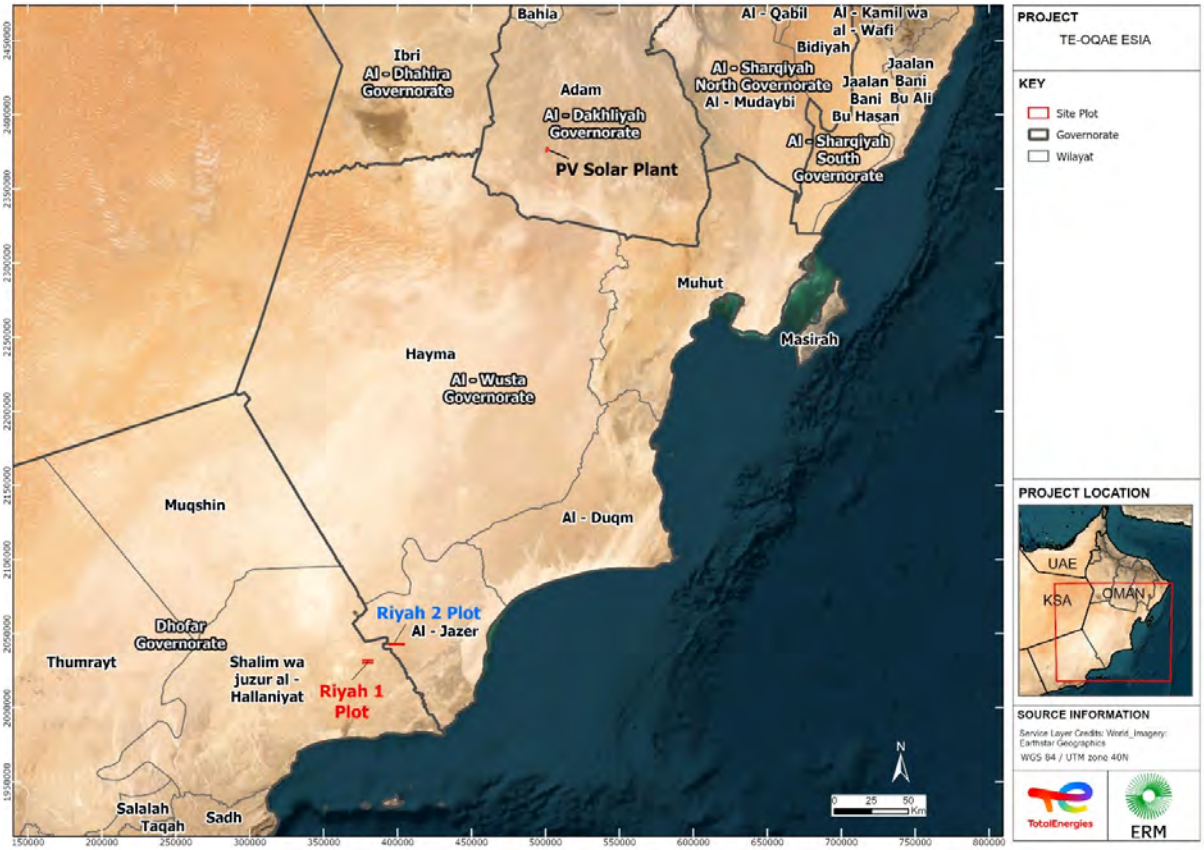
The Projects are in different governorates in Oman. The PV Solar Plant is located in Al Dakhliyah, while Riyah 1 wind farm is in Dhofar and Riyah 2 in Al Wusta. Figure 2-1 depicts the locations of the Projects along with the boundaries of their respective governorates. Table 2-4 details the governorate and wilayat for each project.

TABLE 2-4 PROJECT LOCATION BY GOVERNORATE AND WILAYAT

Project	Governorate	Wilayat
PV Solar Plant	Al Dakhliyah	Adam
Riyah Wind 1	Dhofar	Shaleem wa Juzur Hallaniyat
Riyah Wind 2	Al Wusta	Al Jazer

The three sites fall within Block 6 concession area and are owned by the Oman Government and leased to PDO under a Concession Agreement due to expire in 2044. Under the agreement, PDO and its partners have the right to carry out activities to explore and produce oil from Block 6.

FIGURE 2-1 LOCATION OF THE PROPOSED PROJECTS IN OMAN



Source: ERM, 2024

3. SOCIOECONOMIC CONTEXT

The Projects' socioeconomic context revolves around oil and gas concession areas, specifically Block 6, located in central and southern Oman and operated by PDO. The Project sites are undeveloped, with no permanent structures or utilities. The areas surrounding the Project sites have been modified and disturbed by extensive PDO activities relating to hydrocarbon production.

While the oil and gas industry operate across these regions, the industry primarily supports the local economy through the procurement of services from local businesses rather than direct employment.

In terms of demographics, the population around all three project sites is sparse.

For the PV Solar Plant, the nearest inhabited settlement is Abu Thaylah, a small community with around 14 houses, known as 'Shabbiyah housing,' provided by the Ministry of Housing and Urban Planning, along with nine agricultural compounds. According to the 2020 census, Abu Thaylah had a population of approximately 161, with 43 percent being non-Omanis, a higher proportion of foreign residents compared to the broader Wilayat level.

For the Riyah 1 and Riyah 2 wind farms, the closest inhabited site is Shaybun. Located approximately 14.6 km from Riyah 1 and 1.9 km from Riyah 2, this walled compound contains

an accommodation block that houses a small group of laborers, estimated to be between one and five.

About 1 km from Shaybun lies Wadi Shaybun, a scattered collection of four to five azbah, which are not classified as settlements or permanent dwellings. The term "azbah" traditionally refers to informal structures used seasonally for agricultural purposes, such as camel husbandry, and not for permanent residence. These structures have no legal status (e.g., lease or tenancy agreements). According to the socioeconomic baseline in ESIA B, one clearly abandoned azbah, in disrepair and unused for several years, is located around 200 meters from the Riyah 1 project site boundary. The current use of the azbah was unconfirmed at the time this report was drafted.

The areas surrounding all three project sites —North Solar Oman, Riyah 1, and Riyah 2— share several common livelihoods and income-generating activities. These include:

- **Small Businesses**: Small business ownership is an important source of income, with activities ranging from retail and tailoring to restaurants and logistics.
- **Employment in Public and Private Sectors**: Employment opportunities in both the public and private sectors are key income sources.
- **Agriculture and Livestock Husbandry**: All three regions heavily rely on agriculture and animal husbandry, particularly the raising of camels, goats, and sheep. Livestock not only provides income and sustenance but also holds significant social and cultural importance, especially camels and goats.

Traditionally, residents have used the Projects sites and the surrounding Concession Area for pastoral grazing, with herders traveling from as far as 165 km away (from Riyah 2) to bring their animals when conditions are favorable. Livestock graze and browse extensively over the desert rangelands. Depending on how much rain falls in any particular year, livestock generally require supplementary feeding with concentrate or fresh feed, both of which represent a significant direct cost to the owner. Camel herders may use some of the azbah nearby.

4. REGULATORY FRAMEWORK FOR HUMAN RIGHTS

Oman has ratified or accessed some international and regional treaties, covenants and conventions. The International Convention on Civil and Political Rights and the Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families (1966) have, however, not been accessed or ratified. Below are the international conventions or treaties which have been accessed by Oman.

TABLE 4-1. INTERNATIONAL CONVENTIONS ON HUMAN RIGHTS AND OMANI STATUS

Core International Human Rights Instruments Convention	Oman Status[1]
International Covenant on Economic, Social and Cultural Rights (CESCR), 1966	Accessed 9 Jun 2020
Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), 1979	Accessed 7 Feb 2006
Convention on the Elimination of All Forms of Racial Discrimination (CERD), 1966	Accessed 2 Jan 2003
Convention against Torture and Other Cruel Inhuman or Degrading Treatment or Punishment (CAT), 1984	Accessed 9 Jun 2020
Convention on the Rights of the Child (CRC), 1989	Accessed 9 Dec 1996
Convention for the Protection of All Persons from Enforced Disappearance (CED), 2006	Accessed 12 Jun 2020
Convention on the Rights of Persons with Disabilities (CRPD), 2006	Ratified 6 Jan 2009

Source: OHCHR 2024

Oman has ratified four out of ten ILO Fundamental Conventions as shown in Table 4-2 Oman has not ratified the fundamental conventions on freedom of association, right to organise, and collective bargaining; equal remuneration; discrimination (employment and occupation); and occupational safety and health.

TABLE 4-2 INTERNATIONAL LABOUR STANDARDS AND OMAN STATUS

Fundamental Labour Conventions	Oman Status
C029 - Forced Labour Convention, 1930	Ratified 30 Oct 1998
C105 - Abolition of Forced Labour Convention, 1957	Ratified 21 Jul 2005
C138 - Minimum Age Convention, 1973 (minimum age specified is 15 years)	Ratified 21 Jul 2005
C182 - Worst Forms of Child Labour Convention, 1999	Ratified 11 Jun 2001

Source: ILO 2024

With regards to national institutions and legal frameworks, Oman has established the following instruments to ensure human rights are protected:

[1] Accession is the direct commitment of a state that did not participate in the negotiations to become a party to that treaty, signifying the intention to be bound by the treaty's provisions and obligations. Ratification is a state's formal approval or confirmation of a treaty it has already signed, involving domestic processes, and signifies binding international commitment. Signature indicates a state's preliminary agreement to a treaty, showing interest, but does not create legal obligations; the state can later choose ratification or accession (UNTERM 2023).

1. Oman's Human Rights Commission (OHRC)

The OHRC was established by the Royal Decree No. 124/2008. It is an independent national entity entrusted with protecting human rights and safeguarding freedom in the Sultanate in accordance with the basic statute of Oman and the international charters and convention. The tasks of the OHRC predominantly relate to monitoring, advising, assisting in resolutions, and reporting (OHRC 2023).

2. Regulation of employment

In Oman, regulation of employment is executed through the Labor Law, promulgated in accordance with Sultani Decree 35/2003, and supplemented by various Ministerial decrees that introduce amendments. Additionally, the Civil Transactions Law, established under the authority of Sultani Decree 29/2013, holds relevance in this domain.

- Wages: The Oman Labor Law states that the Minister of Manpower sets a minimum wage after consultation with the Committee for Joint Dialogue between Production Parties and its approval by the Council of Ministers (Royal Decree No. 53/2023).
- Working hours, rest periods and entitlement to time off: Omani Labour Law sets the maximum regular hours of work per week at 40 hours, with a maximum of 8 hours per day — provided that they are interspersed with an hour per day for rest and meals, totaling one hour daily, which is not counted as part of the working hours. Additionally, the continuous period of work must not exceed 6 hours (Royal Decree No. 53/2023).
- Child Labor: In line with ILO Minimum Age Convention, the Oman Labour Law enacted in 2023 (Royal Decree No. 53/2023), sets the minimum age for employment at 15 years. Young individuals aged 15 to 18 years (minors) are not allowed to work between the hours of 6 p.m. and 6 a.m. Minors are not permitted to work overtime, and the working hours must be interspersed with one or more periods for resting and meals so that the worker does not work for more than four consecutive hours.
- Forced Labor: The Oman Labor Law also prohibits any form of compulsory or coercive work meeting the standard set the ILO Forced Labor Convention. However, it does not specify what is understood by 'compulsory' or 'coercive' work.
- Employment of Migrants: Similar to many other countries in the Gulf region, there is a sponsorship-based legal framework in Oman that defines the relationship between migrant workers and their local sponsor, or kafeel, which is usually their employer. The new Labour Law (Royal Decree No. 53/2023) prohibits employers to withhold passports and other private documents from employees without the worker's written consent.
- Occupational Health and Safety: The Oman Labour Law (Royal Decree No. 53/2023), the Ministerial Decision (No. 286/2008) approving the Regulation on Occupational Safety and Health for Establishments, and the Ministerial decision (No. 11/2008), concerning the approval of the Guide to Labour Inspection, all establish measures to ensure the health and safety of workers in their workplace, defining the obligations of the employer and workers on these matters, including provision of personal protective equipment and seasonal working hours.

4.1 LABOUR RIGHTS IN PRACTICE

Oman's Basic Law guarantees equality for all citizens and prohibits gender-based discrimination (Human Rights Watch 2018). The Labour Law further regulates equality for workers under similar conditions (Article 23) and considers dismissals based on factors such as

gender, race, religion, or pregnancy as arbitrary (Article 12). It also prohibits discriminatory job advertisements (Article 32), though it does not explicitly prohibit discrimination in areas such as access to employment or working conditions based on factors like race, gender, or nationality (US Department of State 2022). The law implies equal pay for men and women by mandating employer equality for its workers although it does not explicitly mention it or outline enforcement mechanisms. Most private sector employers reportedly observe these regulations (US Department of State 2023).

The Labour Law sets the minimum employment age at 15, with restrictions for minors (15-18) on night work, overtime, and hours exceeding six per day. Most employers require proof of basic education, implying most workers are at least 16. According to the US Department of Labour (2022), Oman has systems to enforce child labour laws, with the Ministry of Labour referring cases involving younger children to the Ministry of Social Development. The US Department of Labour (2022) also indicates that, despite limited research, there are signs that a small number of children in Oman may be engaged in child labour, specifically in activities such as fishing and farming.

A significant portion of Oman's workforce is made up of non-Omanis. The Labour Law requires employers to obtain authorization from the Ministry and work permits for hiring non-Omani workers. Similar to many other countries in the Gulf region, Oman uses the kafala system, where migrant workers' legal status is tied to their employer. If misused, this system can lead to exploitation, including underpayment, long hours, poor living conditions, and abuse (Human Rights Watch 2021). Some documented cases of exploitation in Oman include unpaid wages and withheld passports (Fanack 2023; US Department of State 2022). Recent reforms in 2023 prohibit employers from retaining workers' passports without their consent.

The Labour Law prohibits forced labour, however, it does not clearly define what constitutes "forced" or "compulsory" labour, which can potentially leave ambiguities in enforcement.

Occupational health and safety (OHS) regulations require employers to ensure a safe work environment, though comprehensive statistics on OHS compliance are not openly available.

Oman mandates employment quotas for persons with disabilities in both public and private sectors. However, enforcement of these quotas is reportedly inconsistent according to the US Department of State (2022).

Oman does not have specific legislation addressing workplace harassment; however, existing penal provisions may apply in such cases (for more information, see the Human Rights Risk Assessment report).

5. ASSESSMENT METHODOLOGY

To determine the Projects' human rights risks, a four-step process has been employed, which is further detailed below. The development of the approach has been informed by the guidance set out in the UNGP and the Guidance Note on Implementation of Human Rights Risk Assessments Under the Equator Principles.

5.1 STEP 1 – SCREENING

Step 1 involves developing an understanding of the human rights context and conditions, from which potential adverse human rights impacts could be assessed. The focus is on gathering

data required to understand the legal and policy context in place to manage human rights risks and identifying human rights risks considering country and sector risks.

Identification of risks also considers internationally recognized human rights described in the following instruments:

- The Universal Declaration of Human Rights (UDHR).
- The International Covenant on Civil and Political Rights (ICCPR).
- The International Covenant on Economic, Social and Cultural Rights (ICESCR).
- The 10 ILO's Fundamental conventions.

5.2 STEP 2 – SCOPING

Based on the Screening, Step 2 involves scoping, which aims to gain an understanding of how the human rights identified in the screening stage may specifically be impacted due to the Projects. In this scoping exercise, the boundaries of the PV Solar Plant, RW1 and RW2 projects will be established.

5.3 STEP 3 – HIGH-LEVEL RISK ASSESSMENT

Step 3 involves the analysis of the human rights risks that may result from the works planned for the solar plant and wind farms. The focus is on those risks that are considered to be *salient*. The most salient issues are those that pose a significant risk of causing negative impact on rightsholders through the Projects' activities or business relationships. The level of saliency is determined by assessing the severity of the potential impact, considering the scale, scope and irremediability (see Table 5-1 for a definition of each of these factors) and the likelihood of the impact occurring.

The parameters considered to assess severity and likelihood of each potential human rights impact are presented in Table 5-1 and Table 5-2.

TABLE 5-1 ASSESSING SEVERITY

Parameters for assessing severity	
Scale	**Seriousness of actual or potential impact; including consideration of the vulnerability of affected rightsholders**
Low	Unlikely to cause body or psychological harm / change in standard of living
Moderate	Will cause a human rights infringement by denying access to essential life necessities (such as livelihoods, education); OR Will cause an impact to cultural, economic, natural and social assets that identified groups or subject matter experts have identified as highly valued; OR Will cause an impact to ecosystem services identified as priority to livelihoods, health, safety or culture
High	Will cause death or adverse health effects that could lead to significant reduction in quality of life and / or longevity.
Scope	**Number of people that are (or potentially are) affected**
Low	Single person or family or small number of people potentially affected
Moderate	Multiple individuals or families or medium number of people potentially affected
High	Significant number of members of one community or across multiple communities, or large number of people potentially affected
Irremediability	**Degree to which the (actual or potential) harm is irreparable**
Low	Remediation will return the victim to the same or equivalent position. Easy – simple technical requirements, acceptance by the identified group, implementation partner has capacity to deliver.
Moderate	Remediation may return the victim to the same or equivalent position. simpler technical requirements, acceptance by the identified group, implementation partner can deliver with some capacity development.
High	Remediation will not return the victim to the same or equivalent position. Complex technical requirements, little acceptance of remediation by the identified group, low capacity of implementation.
Severity	**A negative human rights impact that is severe by virtue of its scale, scope and / or irremediability**
Low	Low/Low/Low ***OR*** Low/Moderate/Low
Moderate	High/ Moderate/Low ***OR*** High/Low/Low/ ***OR*** Moderate/ Moderate/ Moderate ***OR*** High/Low/Moderate ***OR*** Moderate /Low/ Low ***OR*** Moderate/Low/Moderate ***OR*** Moderate/Moderate/Low
High	High/High/Moderate ***OR*** High/Moderate/Moderate ***OR*** High/High/Low ***OR*** High/High/High

Adapted from ICMM, 2023 and Ipieca, 2021

TABLE 5-2 ASSESSING LIKELIHOOD

Parameters for assessing likelihood	
Likelihood	**Likelihood of the impact occurring which is a combination of the degree to which there are project-inherent risks, risks arising from the operating context, and evidence that the company has faced similar risks in the past that it has failed to properly mitigate**
Unlikely	Unlikely to happen. The impact has never been known to occur
Possible	It is possible that the adverse human rights impact could occur. There is a 50% or greater chance it will occur.
Certain or almost certain	The adverse human rights impact will probably / almost certainly occur, and/or it is already occurring.

TABLE 5-3 OVERALL SALIENCY CLASSIFICATION

Severity	**Likelihood**		
	Unlikely	**Possible**	**Certain or almost certain**
Low	Low	Low	Moderate
Moderate	Low	Moderate	High
High	Moderate	Moderate	High

5.4 STEP 4 – HIGH-LEVEL MANAGEMENT MEASURES

Step 4 involves identifying high-level management measures or additional work required to assist in mitigating potential human rights impacts identified and evaluated in Step 3. This includes a desktop review of documents provided by the Project Company such as relevant corporate policies and procedures.

5.5 LIMITATIONS

This document has been prepared based on publicly available data, secondary data and information provided by the Project Company. ERM did not conduct a site visit as part of this HRRA nor was it possible to conduct interviews with any rightsholders / stakeholders.

ERM relies on information obtained from the Project Company. At the time of this assessment, the Project Company had yet to define the precise staffing requirements for the Projects. Furthermore, the process of selecting the main contractor for the construction phase of the Projects was still in progress. Similarly, information regarding primary suppliers was not available.

ERM's findings are accurate and complete only to the extent that information is provided. The HRRA has been conducted based on the findings from the ESIA. Consequently, all limitations identified in other baseline and impact assessment sections of the ESIA also apply to the HRRA.

6. POTENTIALLY AFFECTED RIGHTS-HOLDERS

The term "rightsholders" refers to individuals or social groups holding distinct entitlements in relation to specific duty bearers (such as state or non-state actors that have a particular obligation or responsibility to respect, promote and realize human rights and abstain from human rights violations) (ENNHRI 2022) and who have inalienable human rights regardless of who they are, their opinions, race, sexual orientation, etc. They may include members of an impacted community residing in close proximity, upstream or downstream of an operation, or those residing along the supply routes. It could also involve workers employed directly by the participating organisations or indirectly through the operation's supply chain. In particular contexts, specific social groups' human rights may not be fully realized, respected or protected, despite all human beings are rights-holders under the Universal Declaration of Human Rights (UNESCWA 2022).

The following rightsholders were identified and considered during this assessment based on the information provided in the socioeconomic baseline, the Project description (see Section 2) and the human rights context described in Section 3.

6.1 POTENTIALLY IMPACTED COMMUNITIES

The communities potentially affected by the Projects are primarily those residing in the few settlements or localities where the herders who use the Project sites come from.

The following vulnerable groups have been identified within the potentially impacted communities:

- Herders who use or have used the land where the Projects are located as they will experience restricted access, either temporarily during the construction phase or long-term, as with the PV Solar Plant, which will be fenced off for the duration of its operation.
- Local unemployed youth, both men and women, who may face competition with Omani nationals from other regions to secure employment.

In terms of demographics, based on 2020 census data, the total

6.2 POTENTIALLY IMPACTED WORKERS

Potentially impacted workers include:

- Workers directly employed for the Projects.
- Workers directly employed by contractors.
- Workers employed by subcontractors (companies engaged by other subcontractors to provide services needed to support the construction process including transport services and support staff).
- Workers employed by primary suppliers[2] (companies that supply the goods required by the Project including construction materials and food).
- Workers employed by second tier and beyond suppliers' workers.

[2] As per the World Bank Environmental and Social Framework (2017), 'primary suppliers' are those suppliers who, on an ongoing basis, provide directly to the project goods or materials essential for the core functions of the project. This assessment considers primary suppliers those engaged by the Project Company and contractors.

Even though the specific breakdown of genders among the construction workers was not known at the time of preparing this assessment, it is anticipated that the construction and operational stages will mostly involve male workers, drawing from the experience of comparable projects.

Vulnerable groups within the Projects' workforce include:

- Female workers
- LGBTQI+ workers
- Low wage migrant workers
- Workers with disability

7. SCOPING OF THE HUMAN RIGHTS ISSUES RELATED TO THE PROJECT

Following the identification of human rights holders, a scoping of human rights risks was conducted, covering the following aspects:

- Human rights related to potentially impacted communities.
- Human rights pertaining to potentially impacted workers.

The results are presented in the scoping table in **Appendix A**.

8. RESULTS OF HUMAN RIGHTS RISK ASSESSMENT AND THE PROPOSED MITIGATION MEASURES

Table 8-1 below describes the human rights risks, existing mitigation measures, additional mitigation measures to reduce the risks to acceptable levels and classification of the residual risks.

TABLE 8-1 HUMAN RIGHTS RISKS AND PROPOSED MITIGATION MEASURES

Ref No.	Potential Impact and Justification	Company involvement	Whose Rights at Risk	Rights at Risk	Existing Management Measures and Planned Activities	Saliency	Additional Recommended Management Measures	Residual Risk Level
Human rights in the workplace								
1.1	***Multiple severe injuries to workers as a result of occupational health and safety incidents that could have serious and potentially irreparable consequences such as permanent disability or fatality.*** **Scale = High** **Scope= Moderate** **Irremediability= Moderate** **Severity = High** **Likelihood = Almost certain**	Cause	All Project workers	Rights to safe and healthy working conditions	**Planning and Assessment:** • OHS Plan within the Health and Safety Management System. • Conduct Hazard Identification Study (HAZID) and risk assessment, including environmental and natural hazards, to inform Health and Safety Management System • Consider H&S performance in contractor and supplier selection process. **Enforcement and Control:** • Enforce Health and Safety management system for all Project personnel with training, monitoring, inspection, and audits. • Implement control measures from risk assessments. • Potential contractors and suppliers will have to meet health, safety, and quality standards. • Contracts will establish Government's right to monitor and audit, as well as consequences of breaching applicable requirements, standards, policies, and clauses. **Safety Standards:** • Provide induction, training, and hazard awareness. • Stop-Work mandate if controls are not in place. • Contractors are required to establish and communicate Emergency Response Plans. **Health Surveillance:** • Implementation of Health Surveillance Programme, with regular medical check-ups and medical assistance for all Project personnel. • Establishment of a health and safety committee with responsibilities over training, monitoring, safety checks and audits.	High	• Appoint Health & Safety and Labour Officers within the Project team and the EPC Contractor's organisation with specific responsibilities for the implementation and monitoring of the OHS Plan, TTE's Health, Safety, Societal, Security and Environment (H3SE) requirements and Code of Conduct covering the different Project activities as well as worker accommodation. • Frequent site inspections/ supervision and controls should be included in Health and Safety monitoring process to strengthen the implementation and practices in the field. • Conduct audits of accommodation camps using a checklist derived from the IFC/EBRD guidance note "Workers' Accommodation: Processes and Standards. • Frequent refresher training on safety standards and shared responsibility for safety. • Ongoing worker engagement (formal and/or informal) to verify understanding of and adherence to safety standards.	Moderate

Ref No.	Potential Impact and Justification	Company involvement	Whose Rights at Risk	Rights at Risk	Existing Management Measures and Planned Activities	Saliency	Additional Recommended Management Measures	Residual Risk Level
					Resources and equipment: • Minimum requirements for contractors include the provision of welfare facilities, first aid facilities and health assistance, the guarantee that trained personnel are present on site, and the establishment and communication of Emergency Response Plans prior to commencing any works. • Provision of H&S training to all Project personnel, including fire safety training and hazards (chemical, cold surfaces), as well as equipment, and personal protective equipment (PPE). **Safe Operations:** • Implement Permit to Work (PTW) system for hazardous tasks. • Follow lockout/tagout procedures for equipment isolation.		• Share insights from OHS near misses, incidents, and data to foster continuous improvement in OHS management. Utilize these lessons to identify areas for enhancement, refine safety protocols, and strengthen commitment to personnel well-being.	
1.2	***Unfair treatment, harassment or prejudice against people or groups due to gender identity, sexual orientation, or country of origin in employment matters.*** **Scale = Moderate** **Scope= Low** **Irremediability = Moderate** **<u>Severity</u> = Moderate** **<u>Likelihood</u> = Possible**	Cause / Contribute	Project workers — especially those working for contractors and subcontractors —who may be subject to discriminatory practices. Sexual minorities, and migrant workers are particularly at risk.	Right to equal treatment in employment without discrimination	• The TTE's Human Rights Guide defines harassment and its role in inhibiting in particular the advancement of ethnic or gender minorities and women in the workplace. It calls for prevention policies, open communication, training and a speak up climate to allow workers to report any incidents of harassment, which must be handled promptly and responsibly without retaliation against the complainant. • Project suppliers and subcontractors are required to comply with TTE's Fundamental Principles of Purchasing which prohibits practices resulting in discriminatory treatment of workers with particular attention to recruitment, compensation, benefits, or termination. • A Workers Management Plan (WMP) specific to the Project will be developed encompassing, amongst other elements: ◦ As part of their induction, all workers will be provided with sufficient and adequate information on their rights under Omani	Moderate	• Human Resources Policy to include a clear non-discrimination (on all forms of discrimination) clause. • Workforce trainings to raise awareness on diverse cultural and ethnic backgrounds of workers present on-site; trainings are also to be delivered to personnel responsible for the employment process (e.g., human resources and recruiting staff).	Low

Ref No.	Potential Impact and Justification	Company involvement	Whose Rights at Risk	Rights at Risk	Existing Management Measures and Planned Activities	Saliency	Additional Recommended Management Measures	Residual Risk Level
					labour and social security legislation and Company Standards; ◦ All workers (including those of contractors and subcontractors) should enjoy working conditions that allow them to exercise freedom of association and collective bargaining; ◦ All workers (including those of contractors and subcontractors) will be provided with written contracts which clearly state the terms and conditions of their employment. Contracts will be verbally explained to all workers, in a language they understand, where this is necessary to ensure that workers understand their rights. Contracts must be in place prior to workers leaving their home location stipulating working hours, pay, and other terms of employment; ◦ Contractual agreements with contractors and suppliers will establish that the Project Proponent will monitor the effective implementation of the WMP and that it reserves the right to audit working conditions at the workplace, as well as the consequences for breaching national legal requirements, international standards, Company policies, or contractual clauses. Contractual agreements with contractors and suppliers will establish that the same standards will be applied to subcontractors. ◦ Supplier qualification, assessment, onboarding, and monitoring will take into consideration performance with regard to worker management, worker rights, health and safety; ◦ Ensure adequate oversight to comply with applicable legislation and international standards on young workers below the age of 18 and under-age child workers; ◦ Review and monitor the outcomes of community engagement, media coverage and its workforce and community grievance mechanism for additional indications of labour-related issues that may be arising;			

Ref No.	Potential Impact and Justification	Company involvement	Whose Rights at Risk	Rights at Risk	Existing Management Measures and Planned Activities	Saliency	Additional Recommended Management Measures	Residual Risk Level
					◦ Develop a Human Resources Policy outlining the Company's approach to managing workers consistent with the requirements of IFC Performance Standard 2. Require contractors and suppliers to put in place policies in line with national legislation and international regulations; and ◦ The development of the Workers Management Plan should be informed by the findings and recommendations of this HRRA and considering the sensitivities of migrant and expatriate workers in Oman to better understand labour welfare and associated social risks. • The supplier selection process will give consideration to workers' management and workers' rights performance. • The Project Company will establish and maintain a grievance mechanism aligned with the UNGP's effectiveness criteria which will be accessible to all Project workforce, including contractor and subcontractor workers who, in the event that their grievance is not adequately resolved by their direct employer, could resort to The Project Company's grievance channels. Furthermore, the Company will require all contractors and sub-contractors to put in place their own worker grievance mechanism and to make it accessible to all workers, whether permanent or temporary, directly or indirectly employed.			
1.3	***Different forms of gender-based violence and harassment (GBVH) of women.*** **Scale = High** **Scope = Low** **Irremediability = Moderate** **<u>Severity</u> = Moderate**	Cause / Contribute	Female Project workers who may be subject to different forms of gender-based violence and	Right to safe and healthy working conditions Right to fair and decent working conditions.	• The Company's Human Rights Guide defines harassment and its role in inhibiting in particular the advancement of ethnic or gender minorities and women in the workplace. It calls for prevention policies, open communication, training and a speak up climate to allow workers to report any incidents of harassment, which must be handled promptly and responsibly without retaliation against the complainant. • Project suppliers and subcontractors are required to comply with TTE's Fundamental	Moderate	• Within the scope of the WMP the following elements should be included: ◦ Consideration of the risks for female workers engaged by Project contractors and subcontractors. ◦ Establish, implement and monitor a plan to prevent, mitigate, manage and respond to GBVH with the	Low

Ref No.	Potential Impact and Justification	Company involvement	Whose Rights at Risk	Rights at Risk	Existing Management Measures and Planned Activities	Saliency	Additional Recommended Management Measures	Residual Risk Level
	<u>Likelihood</u> = Possible		harassment	Right to equal treatment in employment without discrimination. Right to freedom from torture and other cruel or degrading treatment or punishment. Women's rights	Principles of Purchasing which prohibits harassment at the workplace. • A WMP specific to the Project will be developed encompassing, amongst other elements: ◦ The findings of this HRRA. ◦ Prohibition of discrimination based on gender, marital status, nationality, age, religion, or sexual orientation. ◦ All Project workers receive workers' rights training during induction as per National legislation and company standards. ◦ The Project Company reserves the right to monitor and audit compliance with labour standards and this will be stated in agreement with contractors, as well as the consequences for breaches and the expectation for subcontractors and suppliers to be bound to the same standards. ◦ Compliance monitoring program to be implemented by the Project Company and contractors, including KPIs around worker rights, discrimination, and management, workers' grievance mechanism and monitoring of outcomes. • The supplier selection process will give consideration to workers' management and workers' rights performance. • The Project Company will establish and maintain a grievance mechanism aligned with the UNGP's effectiveness criteria which will be accessible to all Project workforce, including contractor and subcontractor workers who, in the event that their grievance is not adequately resolved by their direct employer, could resort to The Project Company's grievance channels. Furthermore, the Company will require all contractors and sub-contractors to put in place their own worker grievance mechanism and to make it accessible to all workers, whether permanent or temporary, directly or indirectly employed.		participation of local female staff. The plan should include measures such as ensuring access to clean, safe, secure and separate toilet and welfare facilities at work. ◦ Adopt a workplace policy on violence and harassment clearly stating the unacceptability of any form of GBVH. ◦ Consider violence and harassment and associated psychosocial risks as part of the management of occupational health and safety risks. ◦ Provide Project workers, including contractor's and subcontractor's personnel, with specific GBVH training based on the risks identified, to raise awareness of the GBVH prevention plan. ◦ Deploy the required resources for effective means of inspection and investigation of cases of violence and harassment, including through labour inspections and monitoring. • As part of the Grievance Mechanism, include explicit measures to address grievances linked to GBVH (for instance, allowing the person filing the grievance to share it with an individual of their chosen gender, like a woman opting to discuss the grievance with another woman).	

Ref No.	Potential Impact and Justification	Company involvement	Whose Rights at Risk	Rights at Risk	Existing Management Measures and Planned Activities	Saliency	Additional Recommended Management Measures	Residual Risk Level
1.4	***Workers not being able to form or join trade unions of their choice, and/or to engage in collective bargaining to improve their working conditions.*** **Scale = Moderate** **Scope Moderate** **Irremediability= Low** **<u>Severity</u> = Moderate** **<u>Likelihood</u> = Possible**	Contribute to / Direct link	Project workers, including own staff, contracted and supply chain staff.	Freedom of association and collective bargaining Right to strike	• The Project Company acknowledges worker's rights to join unions of their choosing and to bargain collectively, including the rights of contractors' workers. Project suppliers and subcontractors are required to comply with TTE's Fundamental Principles of Purchasing which calls for allowing workers to choose whether to be member of a collective bargaining organization, and, in countries with restricted rights, ensuring employees have the right to participate in a dialogue about their collective work situation. It also requires ensuring that workers can express grievances and concerns without fear of reprisal. • The Project's WMP will be developed considering findings from this HRRA and the workers' rights — including contractors and subcontractors— to join unions and engage in collective bargaining. • A clause will be included in contractual agreements with suppliers and contractors, setting the expectation to adhere to TTE standards and to hold their own suppliers and subcontractors to the same standards. • The Project Company will establish and maintain a grievance mechanism aligned with the UNGP's effectiveness criteria which will be accessible to all Project workforce, including contractor and subcontractor workers who, in the event that their grievance is not adequately resolved by their direct employer, could resort to The Project Company's grievance channels. Furthermore, the Company will require all contractors and sub-contractors to put in place their own worker grievance mechanism and to make it accessible to all workers, whether permanent or temporary, directly or indirectly employed. • The Project Company will develop a Stakeholder Engagement Plan including continuous engagement with the Omani Trade Union and/or other key stakeholders including worker representatives. The SEP	Moderate	• Develop and disclose the Human Resources Policy to all staff, as well as contractors and subcontractors involved in the Project. • Include in the EPC Contractor and sub-contractor's contracts clauses to respect and recognise workers' rights in alignment with ILO, including to freedom of association and collective bargaining. • Auditing and monitoring of working and labour conditions of the EPC Contractor and sub-contractors on Project site to ensure inclusion of all types of workers.	Low

Ref No.	Potential Impact and Justification	Company involvement	Whose Rights at Risk	Rights at Risk	Existing Management Measures and Planned Activities	Saliency	Additional Recommended Management Measures	Residual Risk Level
					will be a live document which will be regularly updated.			
1.5	***Negative impacts on the health and wellbeing (mental health) of children, including access to education and social development.*** **Scale = Moderate** **Scope= Low** **Irremediability= Moderate** **<u>Severity</u> = Moderate** **<u>Likelihood</u> = Possible**	Contributed / Direct link	Children within the Project's supply chain engaged in child labour.	Right against worst forms of child labour Children's rights to: -health and to an adequate standard of living. -education; -rest and leisure and to cultural life; -protection from economic exploitation	• The Project Company prohibits child labour in all its operations around the world. Project suppliers and subcontractors are required to comply with TTE's Fundamental Principles of Purchasing which forbid employment of workers underage of 18 for any form of hazardous work, and the employment of workers under the age of 15, except where local law provides for greater protection for the child. • The Project's WMP will be developed considering findings from this HRRA and the required monitoring mechanism to oversee compliance with child labour laws by contractors. • The Project Company will establish and maintain a grievance mechanism aligned with the UNGP's effectiveness criteria which will be accessible to all Project workforce, including contractor and subcontractor workers who, in the event that their grievance is not adequately resolved by their direct employer, could resort to The Project Company's grievance channels. Furthermore, the Company will require all contractors and sub-contractors to put in place their own worker grievance mechanism and to make it accessible to all workers, whether permanent or temporary, directly or indirectly employed. • A clause will be included in contractual agreements with suppliers and contractors, setting the expectation to adhere to TTE standards and to hold their own suppliers and subcontractors to the same standards.	Moderate	• Once the EPC contractor and other contractors are selected, evaluate the supply chain structures within the Project to pinpoint suppliers posing the highest risk of negative human rights effects. • Provide Project contract managers with training on human rights principles and policies relevant to their responsibilities. • Perform routine audits of supply chain entities to assess key labour rights, encompassing issues like child labour, forced labour, and occupational health and safety. • Assign clear responsibilities and lines of accountability for overseeing compliance with child labour laws among contractors and subcontractors (audit program). • Develop a modern slavery escalation and remediation procedure based on best-practice to provide a rapid response support service to potential victims of child, bonded, forced labour, or other forms of modern slavery. • If required, identify trusted partners who could support in remediating potential cases of child, bonded,	Low

Ref No.	Potential Impact and Justification	Company involvement	Whose Rights at Risk	Rights at Risk	Existing Management Measures and Planned Activities	Saliency	Additional Recommended Management Measures	Residual Risk Level
							forced labour, or other forms of modern slavery.	
1.6	***Negative impacts on the health and wellbeing (mental health) of persons affected by labour exploitation due to situations of dependence of sponsor that enhance abusive relationships.*** **Scale = Moderate/High** **Scope= Low** **Irremediability= Moderate** **<u>Severity</u> = Moderate** **<u>Likelihood</u> = Possible**	Cause / Contribute	Subcontractors' workers. Supply chain workers. Vulnerable workers: migrant workers who are required to return their recruitment fees.	Right to freedom from forced labour and servitude Right to freedom from torture and other cruel or degrading treatment or punishment Right to freedom of movement	• The Project Company prohibits forced labour in all its operations. TTE demands from all its Business units that they ensure that all its employees have freely chosen their jobs and that they are free to leave under their terms of employment. Project suppliers and subcontractors are required to comply with TTE's Fundamental Principles of Purchasing which forbid coercing workers into involuntary work, confiscating identity documents, or charging recruitment fees to workers. • The Project's WMP will be developed considering findings from this HRRA and will encompass: ◦ the development of a Human Resources Policy outlining worker rights, including working hours, compensation, time-off. ◦ induction training for all Project workers on workers' rights as per National legislation and company standards. ◦ contracts of employment which must be in place before workers leave home location and clearly outlining terms and conditions of employment, and legal rights. These will be verbally explained if necessary. ◦ The Project Company reserves the right to monitor and audit compliance with labour standards and this will be stated in agreement with contractors, as well as the consequences for breaches and the expectation for subcontractors and suppliers to be bound to the same standards. ◦ Compliance monitoring program to be implemented by The Project Company and contractors, including KPIs around worker rights, discrimination, and management, workers grievance mechanism and monitoring of outcomes.	Moderate	• Once the EPC contractor and other contractors are selected, evaluate the supply chain structures within the Project to pinpoint suppliers posing the highest risk of negative human rights effects. • Provide Project contract managers with training on human rights principles and policies relevant to their responsibilities. • Perform routine audits of supply chain entities to assess key labour rights, encompassing issues like child labour, forced labour, and occupational health and safety. • Develop a modern slavery escalation and remediation procedure based on best-practice to provide a rapid response support service to potential victims of child, bonded, forced labour, or other forms of modern slavery. • If required, identify trusted partners who could support in remediating potential cases of child, bonded, forced labour, or other forms of modern slavery.	Low

Ref No.	Potential Impact and Justification	Company involvement	Whose Rights at Risk	Rights at Risk	Existing Management Measures and Planned Activities	Saliency	Additional Recommended Management Measures	Residual Risk Level
					• The Project Company will establish and maintain a grievance mechanism aligned with the UNGP's effectiveness criteria which will be accessible to all Project workforce, including contractor and subcontractor workers who, in the event that their grievance is not adequately resolved by their direct employer, could resort to The Project Company's grievance channels. Furthermore, the Company will require all contractors and sub-contractors to put in place their own worker grievance mechanism and to make it accessible to all workers, whether permanent or temporary, directly or indirectly employed. • A clause will be included in contractual agreements with suppliers and contractors, setting the expectation to adhere to TTE standards and to hold their own suppliers and subcontractors to the same standards.			
1.7	***Discrimination and unequal treatment of local community members and migrant workers during the selection of project personnel*** **Scale = Moderate** **Scope= Low** **Irremediability= Moderate** **<u>Severity</u> = Moderate** **<u>Likelihood</u> = Possible**	Cause / Contribution	Locals actively seeking employment within the industrial sector Qualified unemployed youth Vulnerable jobseekers: women, people with disabilities, migrant workers	Right to non-discrimination Right to equality before the law Right to freedom of thought, conscience and religion Right to participate in the cultural life of the community Rights of persons	• The Company's Human Rights Guide clearly state the unacceptability of any form of discrimination or unfavourable treatment of individuals. It calls for (i) employment-related decisions based on relevant and objective factors (such as merit, experience, tasks, skills, etc); (ii) local content recruitment processes, hiring of local businesses for works and/or services, based on clear, objective, transparent and fair criteria; and (iii) consistent procedures in decision-making processes. • The Project Company commits to a fair, transparent, public and open recruitment process, and prohibits discrimination in the workplace. Project suppliers and subcontractors are required to comply with TE's Fundamental Principles of Purchasing which prohibits practices resulting in discriminatory treatment with particular attention to recruitment, compensation, benefits, or termination.	Moderate	• Human Rights Policy to include a clear non-discrimination (on all forms of discrimination) clause. • Workforce trainings to raise awareness on unconscious bias and the different manners in which unfavourable treatment and discrimination may manifest during the selection of personnel.	Low

Ref No.	Potential Impact and Justification	Company involvement	Whose Rights at Risk	Rights at Risk	Existing Management Measures and Planned Activities	Saliency	Additional Recommended Management Measures	Residual Risk Level
				with disabilities Migrant workers' rights Women's rights	• A WMP specific to the Project will be developed encompassing, amongst other elements: ◦ The findings of this HRRA —which will consider expatriate workers' sensitivities for welfare and social risks. ◦ Prohibition of discrimination based on gender, marital status, nationality, age, religion, or sexual orientation. ◦ All Project workers receive workers' rights training during induction as per National legislation and company standards. ◦ Socioeconomic compliance monitoring program to be implemented by the Project Company and contractors, including KPIs around discrimination, and management, workers' grievance mechanism and monitoring of outcomes. • The supplier selection process will give consideration to workers' management and workers' rights performance. • The Project Company will establish and maintain a grievance mechanism aligned with the UNGP's effectiveness criteria which will be accessible to all members of the local communities. The mechanism will be adapted to the Project's construction phase, with contractor and sub-contractor staff well-versed in third-party grievance resolution. Information about this mechanism will be shared amongst local communities. Furthermore, the EPC Contractor will be required put in place their own grievance mechanism prior to commencement of the construction phase and to make it accessible to communities. Furthermore, the Company will require all contractors and sub-contractors to put in place their own worker grievance mechanism and to make it accessible to all workers, whether permanent or temporary, directly or indirectly employed.			
Human rights within local communities								

Ref No.	Potential Impact and Justification	Company involvement	Whose Rights at Risk	Rights at Risk	Existing Management Measures and Planned Activities	Saliency	Additional Recommended Management Measures	Residual Risk Level
2.1	**Loss of income and pressure on livelihoods and resources depended on by local populations** **Scale = Moderate** **Scope= Low.** **Irremediability= Low.** **Severity = Moderate** **Likelihood = Unlikely**	Contribution	Livestock owners	Right to an adequate standard of living Standard of living	• Stakeholder engagement will be the channel for gathering and confirming information relating to the value of grazing on site, as well as identifying any unique characteristics relating to the agricultural potential of the site. • Prior to the start of construction works, notification will be provided to the relevant Wali to update the relevant sheikhs about key Project milestones. • A community liaison office (CLO) will be appointed by the Project owners who will be responsible for communications with the Wali, sheikhs and the local community generally. • The Wali and local community will have access to a grievance mechanism. Grievances should be acknowledged, registered and addresses in a timely manner. • The Project must be precisely delineated during the construction phase and any steps involving unnecessary occupation of areas outside the specified Project boundaries must be avoided. • Stakeholder engagement will aim to verify and assess the ability of owners of livestock to adapt to the restricted access to grazing areas taken by the Project.	Moderate	• Ensure that the community grievance mechanism caters for the needs of animal herders, considering their moving patterns, language, etc. • The EPC Contractor should clearly mark the construction areas which will be inaccessible to livestock during construction. Signage should be installed, in the appropriate language to notify herders and the local community. The site should be kept in a state that limits the risk of injury or death to camels should they enter the construction area. • Disturbance to any structures where the actual use, occupancy, or ownership by users and/or owners is unconfirmed should be avoided as much as possible.	Low
2.2	• ***Gender-based violence resulting from the temporary influx of workers and service providers into local communities, or from off-duty misconduct of state security or private security personnel*** **Scale = High** **Scope = Low**	Contribution	Members of the local community. Vulnerable community members: - Women - Girls	Right to freedom from violence Right to freedom from torture and degrading treatment Right to health	• The Company's Human Rights Guide provides some recommendations to reduce the risk of acts of sexual and gender-based violence associated with government security forces. • A WMP specific to the Project will be developed encompassing, amongst other elements the implementation of a Workforce Code of Conduct which expressly prohibit sexual interactions of any kind with underage persons. • For private security firms safeguarding subsidiaries, TTE's preliminary assessments cover training on the respect for the rights of	Moderate	• As part of the WMP and the Workforce Code of Conduct, implement the guidance on "*Addressing Gender-Based Violence and Harassment: Emerging Good Practice for the Private Sector*", in particular: ◦ Define the term GBVH and what it covers, with specific examples of behaviour. ◦ State the main elements of the company's GBVH policy.	Low

Ref No.	Potential Impact and Justification	Company involvement	Whose Rights at Risk	Rights at Risk	Existing Management Measures and Planned Activities	Saliency	Additional Recommended Management Measures	Residual Risk Level
	Irremediability = Moderate **<u>Severity</u> = Moderate** **<u>Likelihood</u> = Possible**		- LGBTQI+ - Children from vulnerable household - Those with disabilities	Women's rights Rights of persons with disabilities	individuals. Security firm employees' histories for human rights violations are also screened. • The Project Company will establish and maintain a grievance mechanism aligned with the UNGP's effectiveness criteria which will be accessible to all members of the local communities. The mechanism will be adapted to the Project's construction phase, with contractor and sub-contractor staff well-versed in third-party grievance resolution. Information about this mechanism will be shared amongst local communities. Furthermore, the EPC Contractor will be required put in place their own grievance mechanism prior to commencement of the construction phase and to make it accessible to communities.		◦ Outline the settings where the code applies (e.g., the workplace, travelling to and from work, in employer-provided accommodation, in communications, at work-related social events, in training and travelling for work). ◦ Provide specific guidance on how to report incidents ◦ Outline sanctions and disciplinary measures for violating the Code of Conduct. ◦ Annex 7 on grievance mechanisms and investigative procedures.	

APPENDIX A SCOPING TABLE

Potential impact	Justification	Human rights at risk	Affected rightsholder
Human rights pertaining to workers			
Multiple severe injuries to workers as a result of health and safety accidents that could have serious and potentially irreparable consequences such as permanent disability or fatality.	Given the nature of Project activities during construction, operation and decommissioning phases, workers face occupational health and safety (OHS) hazards arising from factors such as: exposure to harmful substances; lone working; working at height; working in confined spaces; moving parts; falling objects; slips trips and falls; physical load from climbing towers. Additionally, working excessively long hours under strenuous conditions, and/or challenging weather conditions could negatively affect the physical health and mental well-being of the personnel. The construction, oil and gas industries are among the sectors that concentrate more fatal work accidents according to ILO statistics. Based on the information above, it is considered that the Company can **cause** this potential impact.	• Right to safe and healthy working conditions	All Project workers
Unfair treatment, harassment or discrimination against people or groups due to gender identity, sexual orientation, or country of origin in employment matters.	There is a risk that the Project, particularly contractors and subcontractors, could engage in discriminatory practices concerning employment related to individuals' sexual orientation, gender identity, or country of origin. The absence of explicit protections against discrimination based on sexual orientation and gender identity in the Labour Law underscores the gaps in legal safeguards for LGBTQI+ individuals. This could potentially leave them vulnerable to discrimination in employment and other areas. Non-Omani workers may be subject to degrading treatment or lack of equal opportunity for promotion. They do not benefit from the same employment conditions as Omanis. Based on the information above, it is considered that the Company can **cause or contribute** to this potential impact.	• Right to equal treatment in employment without discrimination • Migrant workers' rights	Project workers who may be subject to discriminatory practices or harassment. Sexual minorities, and migrant workers are particularly at risk.
Different forms of gender-based violence and harassment of women.	There is a risk that the Project, particularly contractors and subcontractors, could engage in different forms of gender-based violence and harassment of women. Women are under-represented in the oil and gas industry and face gender-based discrimination, sustained by an overly masculine workplace environment. Single-sex dominated workplaces or workplace cultures that tolerate inappropriate comments, jokes, or derogatory conversations can significantly contribute to the prevalence of systematic harassment. Based on the information above, it is considered that the Company can **cause or contribute** to this potential impact.	• Right to safe and healthy working conditions • Right to equal treatment in employment without discrimination • Right to freedom from torture and other cruel or degrading treatment or punishment.	Female Project workers who may be subject to different forms of gender-based violence and harassment

Potential impact	Justification	Human rights at risk	Affected rightsholder
		• Women's rights	
Workers not being able to form or join trade unions of their choice, and/or to engage in collective bargaining to improve their working conditions.	Omani workers are legally able to organize unions, bargain collectively, and strike. However, there are legal restrictions to these rights including the minimum of 25 workers for a union to be formed, the requirement to affiliate to the government-sponsored federation, and the prohibition of strikes in the oil and gas industry. Violations of workers' right to bargain collectively have been recently reported in the country. Violations of such nature could be particularly damaging for workers in the gas and oil industries who are not permitted to strike. Workers who are part of the Project's supply chain might encounter difficulties in establishing or joining unions and/or may not be able to engage in collective bargaining. Armed forces and public security organisations are not covered by existing labour law. Based on the information above, it is considered that the Company can **contribute to** or be **directly linked to** this potential impact.	• Freedom of association and collective bargaining • Right to strike	Project workers, including own staff, contracted and supply chain staff.
Negative impacts on the health and wellbeing (mental health) of affected children including access to education and social development.	Although there is limited data for child labour in Oman and despite there are systems to enforce child labour laws, indications suggest that small numbers of children are involved in tasks like fishing and farming contributing to child labour. Due to the limited control that The Project Company has over the operations of companies in its supply chain, there is a risk that underage workforce is used within the Project's supply chain, particularly for activities for the food services and aggregates services. Suppliers of construction materials might inadvertently involve child labour. Based on the information above, it is considered that the Company can **contribute to** or be **directly linked to** this potential impact.	• Right against worst forms of child labour • Children's rights to: ◦ health and to an adequate standard of living; ◦ education; ◦ rest and leisure and to cultural life; ◦ protection from economic exploitation	Children working within the supply chain companies engaged by the EPC Contractor.
Negative impacts on the physical health and mental well-being of persons affected by labour exploitation due to situations of dependence of sponsor that enhance abusive relationships.	National legislation prohibits any form of compulsory or coercive work, and new labour law prohibits employers from withholding passports of migrant workers without written consent. Nevertheless, the Kafala system leaves workers vulnerable to exploitation, increasing the risk of forced labour. Expatriates account for approximately 77 percent of the workforce, with most of them coming from India, Bangladesh and Pakistan. Construction is one of the sectors where migrant workers mostly work. Workers within the supply chain companies engaged by the EPC Contractor, especially those hired for tasks like catering, cleaning, and other less skilled positions, as well as suppliers of construction materials, might inadvertently involve forced labour. Workers within the supply chain may be subject also to unpaid or delayed wages and excessive working hours without pay. This could lead to situations of indebtedness that enhance abusive relationships between the workers and their sponsor due to	• Right to freedom from forced labour and servitude • Right to freedom from torture and other cruel or degrading treatment or punishment • Right to freedom of movement	Migrant workers depending on their employer to maintain and renew their work permits.

Potential impact	Justification	Human rights at risk	Affected rightsholder
	workers not being able to reimburse their recruitment fees or pay their sponsors on time. Based on the information above, it is considered that the Company can **contribute to** this potential impact.		
• **Human rights in communities**			
Loss of income and pressure on livelihoods and resources depended on by local populations.	Camel and goat owners may need to deviate their grazing route due to Project temporary and permanent land-take. The Project use of the land may affect seasonal grazing activities/herding practices by preventing traditional users from accessing and utilizing the land as they have in the past. In the unlikely event that they are unable to access open rangeland elsewhere due to the land take by other projects/developments, this may result in indirect economic losses and pressure on the livelihood of herders who informally use the Project site for seasonal grazing of their livestock. Based on the information above, it is considered that the Company can **contribute to** this potential impact.	• Right to an adequate standard of living • Standard of living • Right to food •	Camel and goat owners that potentially may use the site during raining seasons
Gender-based violence resulting from the temporary influx of workers and service providers into local communities, or from off-duty misconduct of state security or private security personnel	It is anticipated that the construction and operational stages will mostly involve male workers. Those who will be away from home will likely be separated from their family and act outside their normal sphere of social control. This can lead to inappropriate and criminal behaviour, such as sexual harassment of women and girls, exploitative sexual relations, and illicit sexual relations with minors from the local community. A large influx of male labour may also lead to an increase in exploitative sexual relationships and human trafficking whereby women and girls are forced into sex work Based on the information above, it is considered that the Company can **contribute to** this potential impact.	• Right to freedom from violence • Right to freedom from torture and degrading treatment • Right to health • Women's rights • Rights of persons with disabilities	Members of the local community. Vulnerable community members: • Women • Girls • LGBTQI+ • Children from vulnerable households • Those with disabilities.

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