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Masdar

230 MWac Azerbaijan Solar PV Project

Environmental and Social Impact Assessment (ESIA)

10 March 2022

Report Summary

Wood was appointed by Masdar (the Client) to provide Environmental and Social Impact Assessment (ESIA) services for the 230 MWac Azerbaijan Solar PV Project (the Project).

The Project is located 60 km south of Baku City in Azerbaijan, nearby Gobustan Mud Volcanoes, and it is part of a bilateral agreement with the government of Azerbaijan. The Project will assist in achieving Azerbaijan's 2025 vision and beyond for the inclusion of renewable energy electricity within its generation mix.

The purpose of this report is to establish the potential environmental and social impacts of the Project drawing on desk-based studies, site surveys and specialist studies. This document has been prepared by Wood with in-country support provided by Synergetics and Sulaco.

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B4	22/02/2022	Amendments to reflect LTA / Lenders' Comments.	Lender Issue.
B5	10/03/2022	Amended to reflect Lender Comments.	Lender Issue.

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Glossary

Abbreviation	Definition
AC	Alternating Current
ADB	Asian Development Bank
AEP	Annual Exceedance Probability
AERA	Energy Regulatory Agency
AFEZ	Alat Free Economic Zone
a.g.l.	Above ground level
a.m.s.l.	Above mean sea level
ANAS	Azerbaijan National Academy of Sciences
AoI	Area of Influence
App.	Appendix
ARS	AzerRoadService
AZN	Azerbaijani manat
BISTP	Baku International Sea Trade Port
b.g.l	Below ground level
c-Si	Crystalline Silicon
CBs	Circuit Breakers
CEMP	Construction Environmental Management Plan
CCRA	Climate Change Risk Assessment
CCTV	Closed-circuit television
CdTe	Cadmium Telluride
CIA	Cumulative Impact Assessment
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLO	Community Liaison Officer
CR	Critically Endangered

Abbreviation	Definition
dB	Decibel
DC	Direct Current
DPs	Displaced Persons
DTM	Digital Terrain Model
EBRD	European Bank for Reconstruction and Development
ED	Effective Date
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EN	Endangered
ESIA	Environmental and Social Impact Assessment
ESMMP	Environmental and Social Management and Monitoring Plan
EMP	Environmental Management Plan
ESMS	Environmental and Social Management System
EPC	Engineer, Procure, Contract
EP	Equator Principle
EPFIs	Equator Principles Financial Institutions
EPRP	Emergency Preparedness and Response Plan
ESWD	European Severe Weather Database
EU	European Union
FAC	Final Acceptance Certificate
FAA	Framework for Action Agreement
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GoA	Government of Azerbaijan

Abbreviation	Definition
GOC	Gobustan Operating Company
GPS	Global Positioning System
HGVs	Heavy Goods Vehicles
HV	High Voltage
HMA	Housing Maintenance Area
H&S	Health and Safety
HR	Human Rights
IA	Implementation Agreement
IBA	Important Bird and Biodiversity Area
IBAT	International Biodiversity Assessment Tool
IDPs	Internally Displaced Persons
IEMA	Institute of Environmental Management and Assessment
IFC	International Finance Corporation
IFIs	International Finance Institutions
IP	Ingress Protection
ILO	International Labour Organisation
IPCC	Intergovernmental Panel on Climate Change
IR	Involuntary Resettlement
IUCN	International Union for the Conservation of Nature
JICA	Japan International Cooperation Agency
KBA	Key Biodiversity Area
LAL	Land Acquisition Law
LC	Least Concern
LCTs	Landscape Character Types
LGVs	Light Goods Vehicles

Abbreviation	Definition
LRP	Livelihood Restoration Plan
LV	Low Voltage
LVIA	Landscape and Visual Impact Assessment
M	Magnitude
MASW	Multi-Channel Analysis of Surface Waves
MFBs	Multi-Family Buildings
MENR	Ministry of Ecology and Natural Resources
MES	Ministry of Emergency Situations
MPPT	Maximum Power Point Tracking
MV	Medium Voltage
MW	Megawatt
MoE	Ministry of Energy
NDC	Nationally Determined Contribution
NGO	Non-Governmental Organization
NT	Near Threatened
NSRs	Noise Sensitive Receptors
NTP	Notice to Proceed
No.	Number
OHL	Overhead line
OHS	Occupational Health & Safety
OHSP	Occupational Health and Safety Plan
OJSC	Open Joint-Stock Company
ONAN	Oil Natural Air Natural
PAC	Provisional Acceptance Certificate
PAH	Project Affected Households

Abbreviation	Definition
PAP	Project Affected People
Par.	Paragraph
POV	Points of View
PPA	Power Purchase Agreement
PR	Performance Requirement
PS	Performance Standard
PV	Photovoltaic
Q2/3	Second/Third Quarter
Q4	Fourth Quarter
QHSE	Quality, Health, Safety & Environment
RWM	Refracted Wave Method
SAARES	State Agency for Alternative and Renewable Energy Sources
SCADA	Supervisory Control and Data Acquisition
SD	Signing Date
SEP	Stakeholder Engagement Plan
SIA	Social Impact Assessment
SLCC	State Land and Cartography Committee
SOCAR	State Oil Company of Azerbaijan Republic
SPS	Safeguard Policy Statement
SWL	Sound Power Level
TA	Technical Advisor
TB	Tuberculosis
TCFD	Task Force on Climate-related Financial Disclosures
TTMP	Traffic and Transportation Management Plan
TRACECA	Transport Corridor Europe-Caucasus-Asia

Abbreviation	Definition
UN	United Nations
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
USD	United States Dollar
VECs	Valued Environmental and Social Components
VP	Viewpoint
VU	Vulnerable
WH	World Heritage
WHO	World Health Organization
WHS	World Heritage Site
ZTV	Zone of Theoretical Visibility

1 Introduction

This Environmental and Social Impact Assessment (ESIA) has been prepared for Masdar for the 230 MWac Solar Photovoltaic (PV) Plant to be located 60 km south of Baku, within the Greater Baku Region (Garadagh district), Absheron Peninsula, Azerbaijan (the Project).

Masdar Azerbaijan Energy LLC (the Company), is a special purpose company incorporated in Azerbaijan, wholly owned by Masdar. The Company is proposing to develop a 230 MWac Solar Photovoltaic (PV) Plant (the Project) to be located 60 km south of Baku, within the Greater Baku Region (Garadagh district), Absheron Peninsula, Azerbaijan. This Environmental and Social Impact Assessment (ESIA) has been prepared on behalf of the Company.

Discussions were held with the Ministry of Energy of the Republic of Azerbaijan ("MoE") in 2018 to discuss potential collaboration. In October 2018, Masdar signed a Framework for Action Agreement ("FAA") with the MoE to formalize the intention of both parties to further discuss and assess the potential collaboration to support the deployment of renewable energy in the Republic of Azerbaijan. Following the signing of the FAA, Masdar and MoE have been in discussion to identify potential site locations, Project capacity, grid connections and other technical, financial and legal related matters.

Masdar assessed three different locations for the potential development of solar and wind projects. Following this, in January 2020, Masdar signed an Implementation Agreement ("IA") with the MoE providing Masdar with the exclusive right to develop a maximum of 230 MWac at Area 60 within Garadagh district.

It is the Company's intention is to acquire international funding for the development of the Project and to obtain the approval from the Local Competent Authority to permit to construct and operate the Project. This document forms the ESIA for the Project which has been developed to meet local and International Standards. Wood has developed the ESIA in collaboration with its partners in Azerbaijan, The Center for Social Technologies "Synergetics" and "Sulaco". A national Environmental Impact Assessment (EIA) was prepared by Sulaco in support of the permit application. This was approved on 10 February 2022.

The ESIA presents information on the identification and assessment of the likely significant environmental and social effects of the Project and its ancillary infrastructure, based on the preliminary screening performed at Scoping phase back in August 2020.

1.1 Background to the Project

On 17 October 2018, the MoE and Masdar entered into a FAA in respect of potential collaboration to support the deployment of renewable energy in the Republic of Azerbaijan (the "Framework for Action Agreement").

On 05 December 2019, the President of the Republic of Azerbaijan issued a Decree on Measures for Implementation of Pilot Projects in the Use of Renewable Energy Sources, establishing a state commission to realise and coordinate the execution of pilot projects regarding the construction of power generation plants using renewable energy sources (including wind and solar).

On 9 January 2020, the MoE and Masdar entered into an IA with respect to a solar PV project of a maximum capacity of 230 MWac at Area 60, 9 km north-west of the Alat settlement, in the Republic of Azerbaijan on a build own operate basis (the "IA").

The Company will sell and deliver to Azerenerji Open Joint-Stock Company (OJSC) and Azerenerji OJSC will purchase and accept from the Company, all electrical energy generated at the Plant within the terms and conditions set out in the dedicated Power Purchase Agreement (PPA). In connection with the entry into the PPA, the Company and Azerenerji OJSC will enter into the Transmission Connection Agreement, under the terms of which Azerenerji OJSC shall provide the Company with access to the Transmission Network for the purposes of exporting electrical energy generated at the Plant.

The Project and related ESIA process have been subject to setbacks given the delay in signing the PPA by the Government of Azerbaijan late October 2020. The Project Agreements have been signed on 06 April 2021, while the Land Lease Agreement is planned to be signed off in April 2022 before the financial closure of the Project.

1.2 The Project Developer

Headquartered in Abu Dhabi, Masdar is one of the world's leading renewable energy companies, developing renewable energy projects, realizing low-carbon urban development, advancing clean-tech innovation and world-class knowledge and industry platforms. As a global leader in the development of commercially viable renewable energy projects in more than 30 countries, Masdar is partnering with the Republic of Azerbaijan to develop this landmark 230MW solar project subject to the current ESIA. With more than a decade of experience, Masdar will be supporting the government of Azerbaijan and its clean energy transition.

The solar project supports Azerbaijan's target of producing 30% of its domestic power needs from renewable energy sources by 2030. The diversification of electricity production via utilising renewable energy sources is one of the main priorities of focus by the President of the Republic of Azerbaijan.

1.3 Scope and Content of the ESIA

In order to successfully develop this Project, the following requirements must be met:

- The Project must meet Azerbaijani national environmental requirements and International Standards (namely the Equator Principles (EPs), International Finance Corporation (IFC) Performance Standards (PSs), European Bank for Reconstruction and Development (EBRD) Performance Requirements (PRs), Asian Development Bank (ADB) Safeguard Policy and Japan International Cooperation Agency (JICA) Guidelines for Environmental and Social Considerations. The International Best Practise Guidelines are provided in more detail within Section 3.4 of this ESIA.
- The Project includes all necessary mitigation measures to minimize any significant adverse effects on environmental, health and safety, and socio-economic conditions.

The overall scope of the ESIA includes:

- Definition of baseline conditions of key environmental and social resources.
- Assessment of positive and negative impacts of the Project.
- Consultation with people who may be affected by the Project and with other potentially affected stakeholders.
- Development of mitigation which is sufficient to avoid, reduce, or compensate for significant adverse environmental and social impacts. Where possible, enhancement measures are also proposed.
- Development of monitoring programs as are necessary to verify mitigation is effective in accomplishing its goals, and to develop and refine the effectiveness of mitigation measures.

As part of the ESIA scoping process, Wood's local consultant, Sulaco, undertook a site visit between 28 and 29 July 2020. This entailed visiting the Project site to collect observations, data and information to describe the current conditions of the Project Area. In addition, the first round of stakeholders' consultation was performed in July 2020. Selected key informants/stakeholders were interviewed following an alternative approach for engagement as recommended by the IFC COVID-19 interim guidance for safe stakeholder engagement[1].

As part of the full ESIA, surveys took place from 09 to 11 April 2021 (particularly covering ecology, cultural heritage, transport / access road and social aspects). A second round of stakeholder consultation was performed during April 2021, following the approach described in Chapter 12 and the Project Stakeholder Engagement Plan (SEP). In addition, a range of stakeholder engagement activities was undertaken during preparation of the Livelihood Restoration Plan (LRP) (September 2021 and January 2022).

1.4 Structure of the ESIA

The remainder of this report is organized as follows:

- Chapter 2 describes the Project and proposed layout.
- Chapter 3 describes the legal and institutional framework and context in which the Project is being proposed and developed.
- Chapter 4 demonstrates the general assessment methodology applied for this ESIA.
- Chapters 5 to 14 describe the baseline environmental and socio-economic conditions of the area, potential impacts that may result from construction, operation and decommissioning, proposed mitigation measures and residual impacts.
- Chapter 15 provides a general summary of impacts that can be expected during construction, operation and decommissioning of the Project. It also includes measures that are needed to prevent, mitigate, or otherwise address potentially significant impacts.

[1] Interim Advice for IFC Clients on Safe Stakeholder Engagement in the Context of COVID-19

- Chapter 16 provides the Environmental and Social Management and Monitoring Plan.
- Chapter 17 provides a list of references.

1.5 ESIA Assumptions and Limitations

The Project will be connected to a new 330kV overhead line (OHL) running along the south-west side of the Project site towards Shirvan urban area reaching the existing substation at Janub. The OHL is to be constructed by Azerenerji and thus financed by the Government of Azerbaijan. The length of the new OHL will be approximately 55 km. Azerenerji OJSC shall design, engineer, procure, supply, erect, deliver, construct, install, test, commission, operate and maintain the Transmission Connection Facilities. It is expected that a corridor 200 m wide (100 m on both sides of the axis of the OHL) will be established, in compliance with national requirements. The OHL EIA was approved on 07 August 2021.

The new OHL will connect to the Alat Trade Zone and the Project. It has been confirmed by the MoE that the OHL will serve a number of other projects in the area. A letter confirming this is provided within Appendix A.

In accordance with the IFC PS 1, an associated facility is defined 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."

Considering this definition, the OHL does not fall under the definition of an associated facility. The OHL has been developed to serve a number of other projects and would proceed if this Project was not being constructed. It has however been considered within the cumulative impacts assessment given its proximity to the Project, with relevant baseline information included into this ESIA to aid the assessment.

The Project has been categorized as a Category B Project at this stage in accordance with EP 1 and EBRD Environmental and Social Policy 2019: *"Projects with potential limited adverse environmental and social risks and / or impacts that are few in number, generally site-specific, largely reversable and readily addressed through mitigation measures"*.

Furthermore, the Project is considered as a Category B for environment impacts, a Category B for involuntary resettlement and Category C for indigenous peoples under

the Asian Development Bank (ADB) safeguard categories:[2].

For environmental impacts, a Category B Project is defined within the ADB Safeguard policy as:

"The proposed project's potential adverse environmental impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination (IEE), including an EMP, is required."

For involuntary resettlement, a Category B Project is defined as:

"A proposed project includes involuntary resettlement impacts that are not deemed significant. A resettlement plan, which includes assessment of social impacts, is required."

Finally, under ADB categorization, the Project is considered Category C relating to indigenous peoples:

"A proposed project is not expected to have impacts on indigenous peoples. No further action is required."

The EPC contractor will develop and implement an Environmental and Social Management System (ESMS) in accordance with the general requirements of PS1, PR1 and ADB Safeguard Policy and the Comapny QHSE Management Systems. The Company will manage the environmental and social risks / impacts identified within this ESIA through its ESMS consistent with the requirements of IFC PS1, EBRD PR1 and ADB Safeguard Policy. The ESMS will incorporate the following elements: (i) policy; (ii) identification of risks and impacts; (iii) management programs; (iv) organizational capacity and competency; (v) emergency preparedness and response; (vi) stakeholder engagement; and (vii) monitoring and review. An Environmental and Social Management and Monitoring Plan (ESMMP) is set out as a separate document to this ESIA and will be transposed into the relevant construction and operational management plans as appropriate.

Formal Occupational Health and Safety (OHS) risk identification and management measures will be incorporated into the Project's Occupational Health and Safety Plan (OHSP) and standard EPC contractual clauses.

[2] ADB, Safeguard policy statement, June 2009 available online https://www.adb.org/documents/safeguard-policy-statement?ref=site/safeguards/main

2 Project Description

2.1 Project Location and Site Setting

The Project site is located in the east of Azerbaijan Republic, on the coastal zone of the south-eastern part of the Gobustan plain, in the south-west of the Absheron Peninsula, Garadagh administrative District of Baku. The Project will entail the development of a 230 MWac Solar PV plant, within a fenced perimeter area of 550 ha, associated sub-station and access road. The Project will be connected to a new 330kV OHL running to the south-west side of the Project site towards Shirvan urban area reaching Janub existing substation, to be constructed by offtaker/MoE and thus financed by the Government of Azerbaijan (GoA). Once developed, the Project will be operational for a 23-year period.

The Project site location is shown in red in Figure 2-1, corresponding to the "Area 60", approx. 60 km south-west from the Baku city and about 8 km from the Caspian Sea coast. The closest urban areas are within Gobustan (5 km east – north-east of Area 60), Atbulag (5 km north-east) and Alyat (8 km south-east of Area 60) municipalities, administrative units of the Garadagh District.

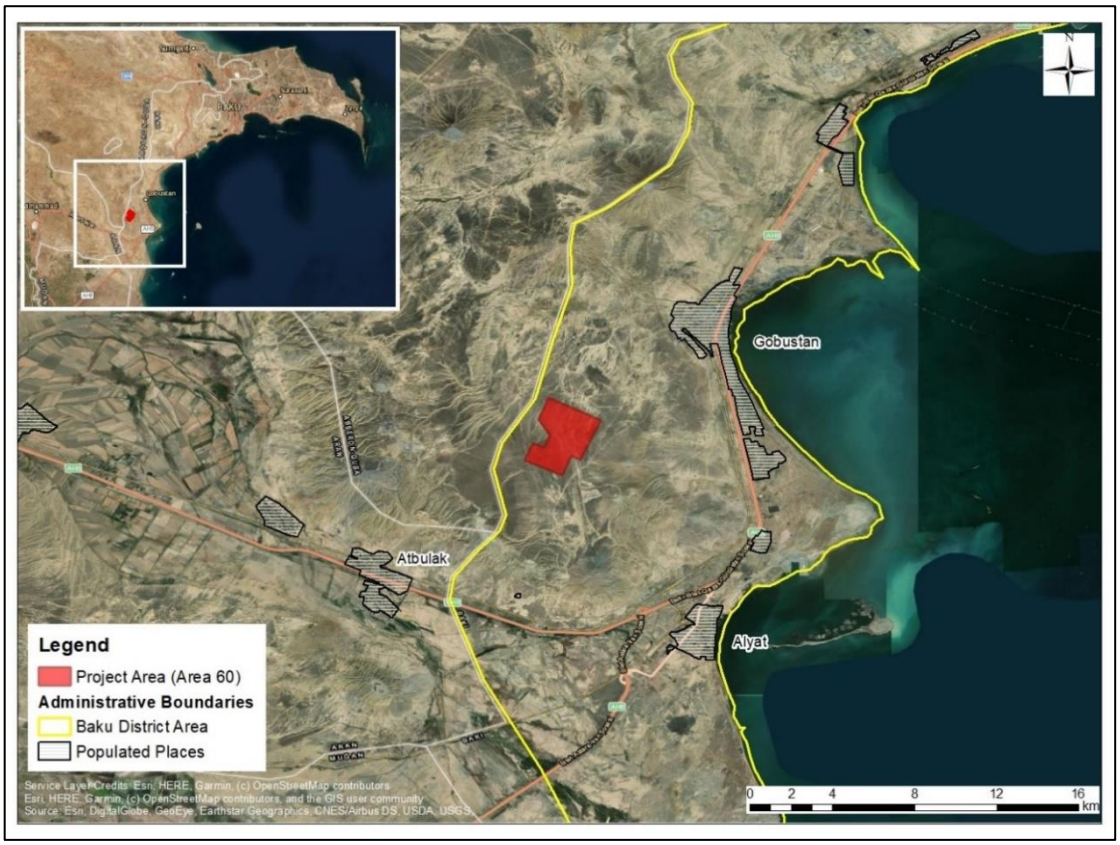


Figure 2-1: Proposed Site Location in Wider Area

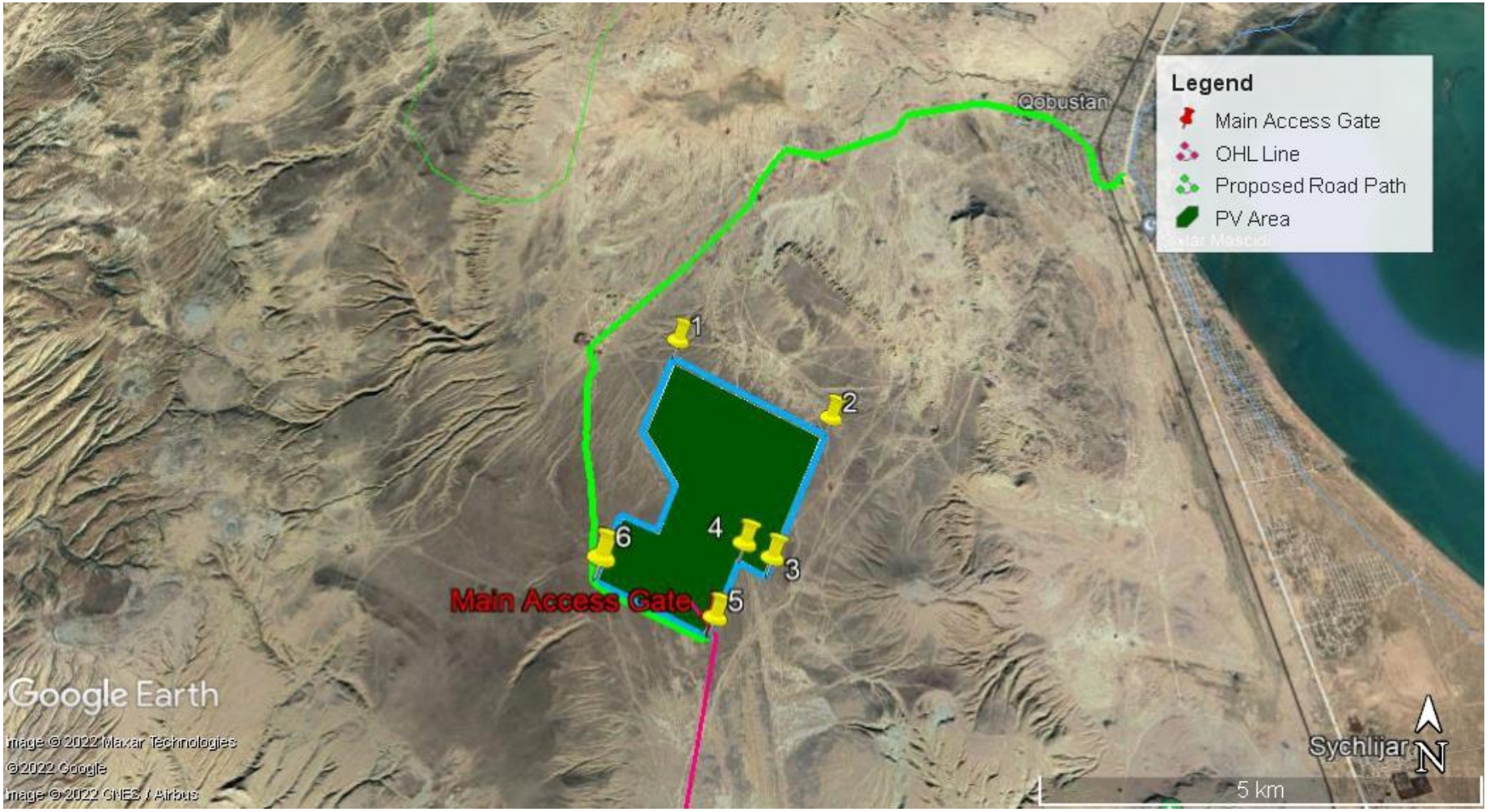


Figure 2-2: Project Location and Access Track

The Project site boundary coordinates are set out in the table below based on the points set out in Figure 2-2.

Table 2-1: Project Site Boundary Coordinates

Point No.	Latitude	Longitude
1	40º2′57.50″N	49º20′17.18″E
2	40° 2'21.05"N	49°21'39.62"E
3	40° 1'19.88"N	49°21'7.71"E
4	40° 1'25.74"N	49°20'53.66"E
5	40° 0'55.45"N	49°20'39.04"E
6	40° 1'17.83"N	49°19'40.96"E

The site is predominantly desert and semi-desert. At the Project site and beyond, especially in the coastal block, plateau and flat landforms prevail with a slope in the southwest direction. The elevation above sea level at site varies within + 100 to 80 m. The closest state-protected natural areas to the Project site is the "Gobustan" National Reserve located around 1.5 km east – north-east of the Project site and extends for 5,000 ha.

The main land users located within the 5 km Project defined Area of Influence[3] (AoI) are livestock farms, which use the area for keeping sheep and small cattle and as a winter pasture. No populated areas are identified inside the Project site boundaries. Closest sheep and cattle farms are located about 300 m up to 3.5 km from the site. More details are reported in Chapter 12 (Socio-Economic).

[3] Please refer to section 4.1 for full definition of the Project Area of Influence.

There are also two cemeteries in the vicinity of the Project area. A recent Muslim cemetery, where the funeral practices still occur, is located at the distance of about 1.2 km from the north-western boundary of the Project area. According to one of the visitors, this cemetery belongs to the Shamly tribe living in the Gobustan settlement of the Garadag district and in some villages of the Hajigabul region. A more ancient cemetery, still used for funeral practices, is located around 0.35 km from the southern boundary of the Project area. More details are reported in Chapter 9 (Archaeology and Cultural Heritage).

Figure 2-3: General Views of the site from southern (on the left) and northern (on the right) boundaries of the Project Area

Figure 2-4: General View from the Project Area showing Flat Areas, with typical surface conditions.

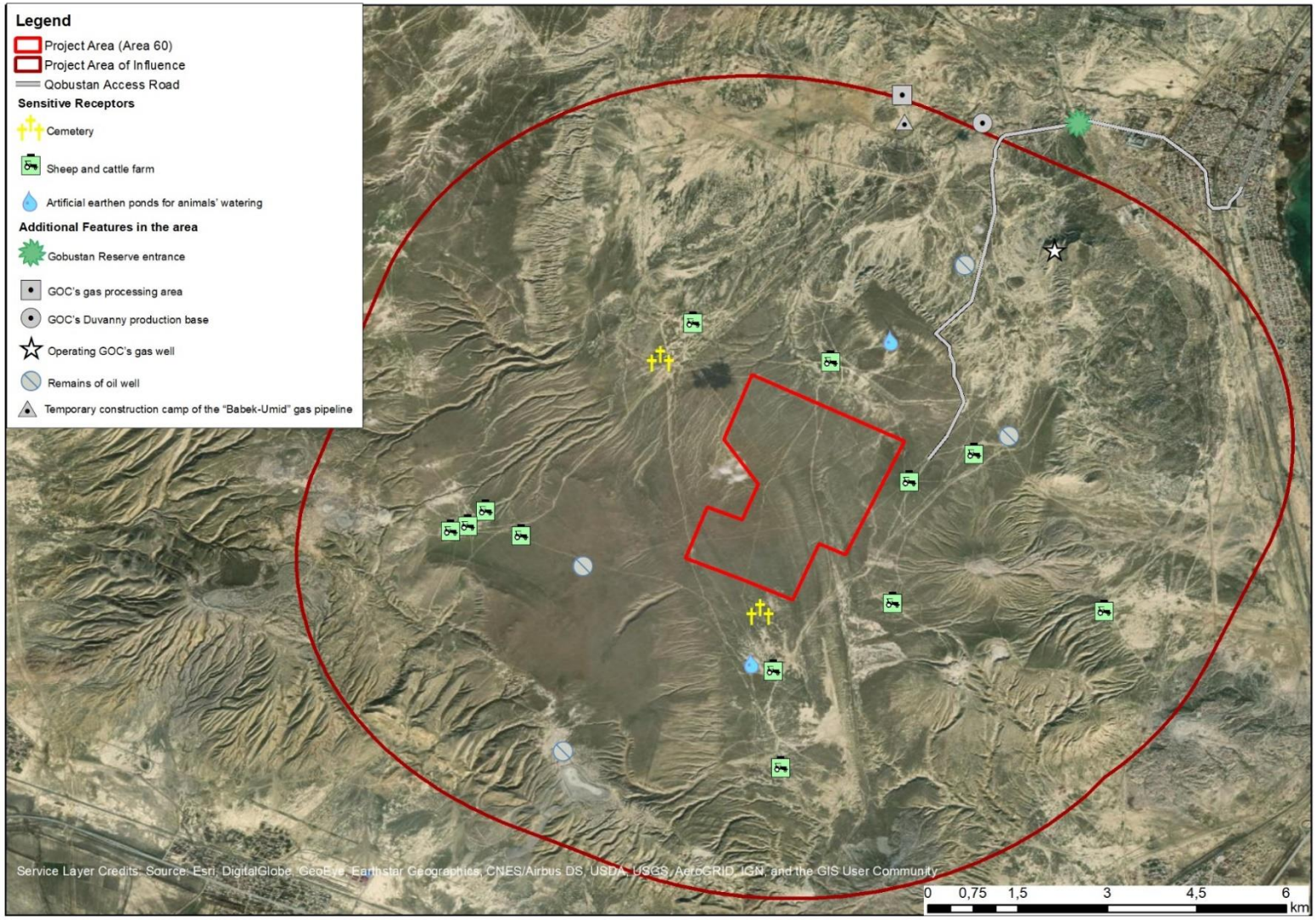


Figure 2-5: Features and receptors identified in the Project Area of Influence.

The Project site is located in the south-west Gobustan Contract Area coastal block which is an onshore oil field in Azerbaijan. This territory is currently operated by the Gobustan Operating Company (GOC), which is part of the SOCAR structure. At approx. 5km from the Project site there is a production base, gas processing units and six active, suspended or abandoned GOC gas wells are spread within 5km buffer Project AoI.

In the north-east direction from the Area 60, at a distance of about 1.2-1.5 km, SOCAR contractors recently completed the construction of the "Babek-Umid" trunk gas pipeline with a diameter of 1000 mm, following from the Dashgil gas field to the Sangachal terminal.

At present the government of Azerbaijan, in order to facilitate the access of tourists to the group of volcanoes (located north-west to the Project site) and improve the road infrastructure of local residents, has initiated the construction of a new two-lane local highway with a width of 8 m and a length of 21 km (refer to Chapter 11 of the ESIA). The new road starts from the entrance to the Gobustan Nature Reserve and runs in the north-western direction. This road is 4 km away from the Project at its closest point.

Implications of new developments in terms of cumulative impacts are analysed in Chapter 13 of the ESIA.

2.2 Project Components

The main components of the solar PV Project are:

- Solar PV modules, to convert solar irradiation into direct current (DC) electricity in a silent and clean process. A PV power plant contains many cells connected together in modules which are then connected in strings to produce the required output.
- Mounting structure or racks, for installing the PV modules at the desired angle. The PV modules installed on the mounting structure are referred to as arrays.
- Inverters for converting DC to alternating current (AC) electricity for connection to the utility grid.
- Step-up Transformers for increasing the AC voltage to enable connection to the grid and reach the AC grid voltage level.

- Electrical substation, where the electricity is exported into the grid network. The substation will also have the required grid interface switchgear such as circuit breakers (CBs) to enable isolation and protection of the PV power plant, as well as metering equipment.
- Access roads.
- Additional Project infrastructure such as scrap yard, storage area, drainage channels, etc.

A representation of a typical solar PV energy park arrangement is shown in Figure 2-6.

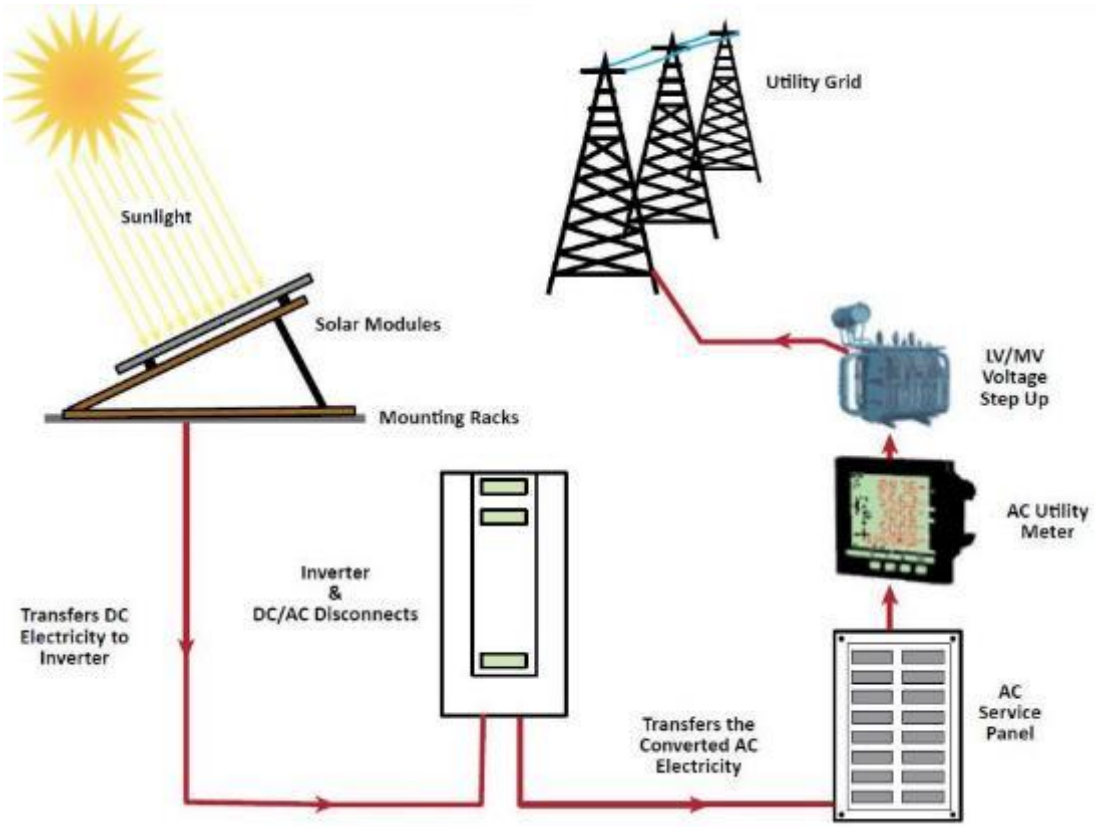


Figure 2-6: Typical solar PV energy park arrangement

The Project will connect to an OHL of approx. 55 km to be built by Azerenerj, which will run along the south-west side of the Project site towards the existing substation at Janub within Shirvan urban area.

Table 2-2: Key Project Components

Component	Parameters*
Inverter Station units:	50
No. PV Modules:	537,624
Total DC kWp:	290,000
Total Export Act. Power (kW):	230,000
Tracker Configuration:	Horizontal Single Axis , 2P
Pitch (Centre to Centre Substructure Spacing)	15 m

*These data are tentative and may be subject to change before the financial closure of the Project

Few details regarding the solar PV components have been provided to date, thus the following has been based on general functional specifications and standards considered applicable to the Project. The proposed Project layout is included as Appendix B of this ESIA.

2.2.1 Photovoltaic (PV) Modules

Solar PV cells convert solar irradiation directly into electricity through the photoelectric effect in a silent and clean process. The output from a solar PV cell is DC electricity. Cells are interconnected in series and parallel and incorporated into a protective casing to form a PV module.

There are different types of PV modules available, classified according to the PV cell technology. The most common of these include (mono and poly) crystalline silicon and cadmium telluride (CdTe) thin film technology. The Company will employ high efficiency Tier 1 bifacial Crystalline Silicon (c-Si). Crystalline silicon cells provide relatively high efficiency modules. Modules are made from cells of either monocrystalline or multicrystalline silicon. Monocrystalline silicon cells are generally slightly more efficient, however are also costlier than multicrystalline.

Modules chosen will undergo an in-house strict quality control and assurance procedure. The PV modules shall have valid certifications issued by reputable testing institutions according to IEC/EN standards.

An example of the appearance of a PV module is given in Figure 2-7. For reference these modules have generally dimensions of approximately 2.0 m by 1.0 m. PV modules shall have a minimum 25-year product performance with linear degradation with peak power rating at year 25 not less than 80% of the original peak power rating.

Figure 2-7: Typical Bifacial PV module

The PV Modules are connected to string inverters that transform the DC generated electricity to AC electricity. Strings of modules are then mounted in structures and arranged in large rows, or arrays, to optimise the space available on site.

2.2.2 Mounting Structures

The PV module structural supports will typically be fabricated from using anodized aluminium or hot-dip galvanised steel, bolts and screws. Piles (if any) shall be constructed of either steel or concrete. If steel is specified, the piles shall be manufactured to withstand increased anticipated levels of corrosion by using hot-dip galvanised steel.

A good quality mounting system may be expected to:

- Have undergone extensive testing to ensure the designs meet or exceed the load conditions experienced at the site.
- Allow the exact tilt angle to be achieved with a small level of uncertainty.
- Allow field adjustments that may reduce installation time and compensate for inaccuracies in placement of foundations.
- Minimise tools and expertise required for installation.
- Adhere to the conditions described in the module manufacturer's installation manual.
- Allow for thermal expansion, using expansion joints where necessary in long sections, so that modules do not experience thermal stresses.

PV module mounting structure shall be either fixed or single-axis tracking. A tracking system involves attaching the PV modules to a table that can move in relation to the sun. This allows for optimal performance throughout the day. Figure 2-8 illustrates a tracking structure used for large-scale solar PV plant. The system structural elements shall comply with the design life expectation of 25 years considering both atmospheric and underground conditions.

Figure 2-8: Rear View of a Typical Tracking Support Structure

Ground mounted structures can have different support systems based on single post or twin-post. In any case, the structure shall be able to withstand the expected wind loads identified for the site.

2.2.2.1 Mounting Structure Foundations

The topographic conditions of the Project site and information gathered during the geotechnical survey will influence the choice of foundation type and support system design as some are more suited to a particular foundation type. Piles are typically installed to the depth of 2.5 m to 3 m below ground, whereas concrete foundation slabs are placed directly onto the ground. The choice of one option over the others depends on the substrate characteristics and the expected wind loads in the area.

Foundation options for ground mounted PV systems typically include:

- **Concrete piers cast in-situ:** These are most suited to small systems and have good tolerance to uneven and sloping terrain. They do not have large economies of scale.
- **Pre-cast concrete ballasts:** This is a common choice for manufacturers having large economies of scale. It is suitable even at places where the ground is difficult to penetrate due to rocky outcrops or subsurface obstacles. This option has low tolerance to uneven or sloping terrain but requires no specialist skills for installation. Consideration must be given to the risk of soil movement or erosion.
- **Driven piles (either by direct ramming or pre-drilling):** If a geotechnical survey proves suitable, a beam or pipe driven into the ground can result in low-cost, large scale installations that can be quickly implemented. Specialist skills and pile driving machinery are required, which may not always be available. However, this technique is most commonly used on PV plants globally.
- **Earth screws:** Helical earth screws typically made of steel have good economics for large scale installations and are tolerant to uneven or sloping terrain. These require specialist skills and machinery to install.

The use of driven piles foundations is considered generally the most attractive choice due to the speed of installation and cost effectiveness for use on large-scale PV plants, and actually the preferred option for the Project. In addition, according to the geotechnical study of the area, the site consists entirely of hard clay layers. No issues are expected in driving the piles, particularly steel piles of 1.5-2.0 meters. The foundation should be made of hot-dip galvanised steel, with a zinc layer thickness depending on the corrosivity category at the site, since soils have been described to be highly aggressive against ordinary portland cement and metal structures at site. It should be designed for a minimum of a 30 years' lifetime.

An example hydraulic driving machine used for installing pile driven foundations is illustrated in Figure 2-9.

Figure 2-9: Hydraulic Driving Machine for Installing Piles

2.2.3 Inverters

Inverters convert DC electricity generated by the PV modules into AC electricity conforming to the local grid requirements for use by the new substation.

The inverter shall be either (i) indoor type and located inside an inverter room or (ii) a proven outdoor type. If outdoor type, the inverters are to be provided within an inverter station designed to withstand to external ambient temperature. There are two broad classes of inverters, central inverters and string inverters. It is expected that the Proponent will install string inverters during the construction of the Project.

The string inverter concept uses multiple inverters for multiple strings of modules, with inverter capacities in the region of approximately 150-250 kVA when used on large-scale PV plants. String inverters provide Maximum Power Point Tracking (MPPT) on a string or dual-string level with all strings being independent of each other. This is useful in cases where modules cannot be installed with the same orientation, where modules of different specifications are being used, or when there are shading issues.

String inverters also have other advantages. First of all, they can be serviced and replaced by non-specialist personnel. Secondly, it is practical to keep spare string inverters on site. This makes it easy to handle unforeseen circumstances, as in the case of an inverter failure. In comparison, the failure of a large central inverter, with a long lead time for repair, can lead to significant yield loss before it can be replaced.

2.2.4 Transformers

Power transformers are electrical devices which convert voltage to different levels. The benefit of their use lies upon the transformation of low voltages, hence high currents, to medium or high voltages, hence much lower currents. This makes it feasible to transfer generated energy to centres of demand through cables of practical dimensions.

Solar PV plantsproduce energy that needs to be injected into the grid. As PV inverters typically operate at low voltages, power transformers are required to step the voltage up to the distribution voltage level. Specifically, transformers are required at the output side of the inverters to step the voltage from the low level (e.g. 400 V) up to the distribution level.

Up to 50 units will be located on the site to house the transformers.

In utility-scale PV Plants, there are usually two different levels of transformers:

- MV/LV Transformers: These transformers elevate the voltage from the output of the inverters to an intermediate voltage level to minimize electrical losses within the PV Plant.
- HV/MV Transformers: These transformers elevate the voltage to comply with grid voltage values as per Offtaker requirements.

A transformer would typically comprise of the components illustrated in Figure 2-10.

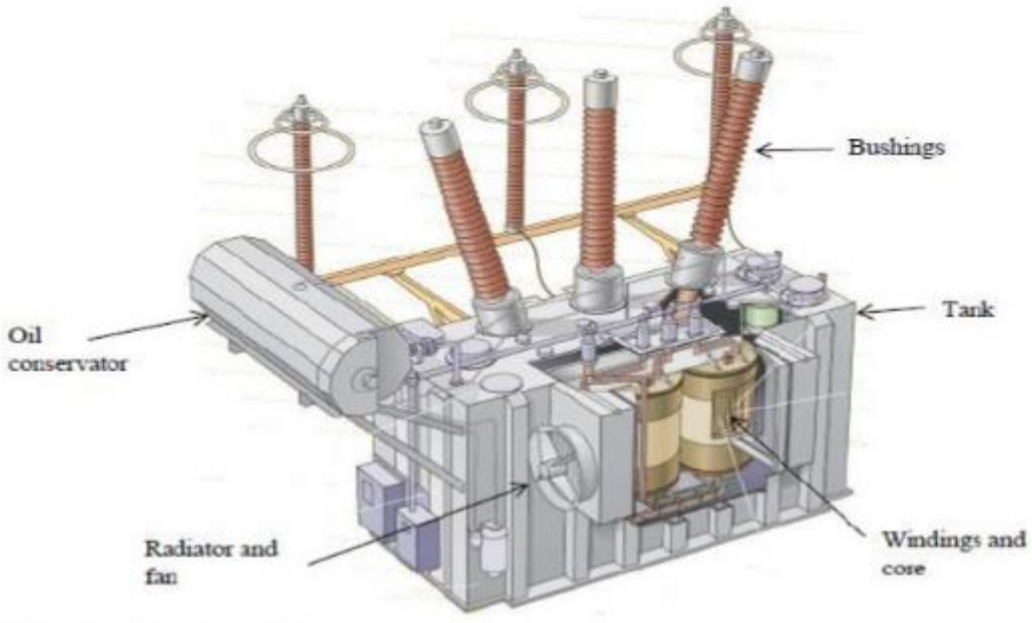


Figure 2-10: Major Components of a Liquid-Immersed Power Transformer

The transformers found in solar applications vary significantly in their characteristics. These are detailed further in Table 2-3.

Table 2-3: Transformers Electrical Characteristics

Category	Electrical Characteristic
Type	Liquid filled or dry type
Nominal Voltage of MV Winding	Depends on the application but typical values include 110 kV, 330 kV, etc. (usually above 35kV)
Nominal Voltage of MV Winding	Depends on the application but typical values include 11 kV, 22 kV, 33 kV, etc. (usually between 1kV and 35kV)
Nominal Voltage of LV Winding	Depends of the application but typical values include 400 V, 660 V, etc. (usually under 1KV)
Capacity	Depends of the size of the inverter.
Frequency	50 Hz or 60 Hz
Number of Windings	Two or three windings
Short Circuit Impedance	10% (likely higher for HV/MV Transformer)
Cooling Method	ONAN, ONAF, OFAF, ODAF
Vector Group	Delta or star connection of windings (Yy, Dy, YNd)

2.2.5 Electrical Substation / Control Centre Compound

The compound will likely be around 100 m x 100 m and will include space for external equipment and a substation building. The control (substation) building includes a switch gear room, control room, storage areas, office, meeting room, living quarters, kitchen and bathrooms with space for showers.

A power substation including several power step-up transformers and switch-gear will be constructed at site for stepping up power to 330 kV standard, that can be accepted by the grid, as well as appropriate switching and power control mechanisms. As shown in the following figure, the IPP substation will be constructed at the south-east corner for the site covering approx. 1 ha.

Figure 2-11: Location of the IPP Substation within the Project Area

2.2.6 Cabling and Communications

Various types of cabling are required to connect the park to the grid network, including:

- LV DC string cables connecting the PV modules to a string combiner box.
- LV DC main cables connecting string combiner boxes to an inverter.
- LV AC cables connecting inverters to a transformer.
- MV AC cables connecting the MV transformers to ring main units and the main Project's substation.
- HV AC cables connecting the HV transformers to the grid.

Communications systems are installed to monitor and control the Project's performance, meteorological conditions and video feeds from security cameras. These systems are connected to the Project's control room using a network of communications cabling. Figure 2-12 shows a typical cable trench detail.

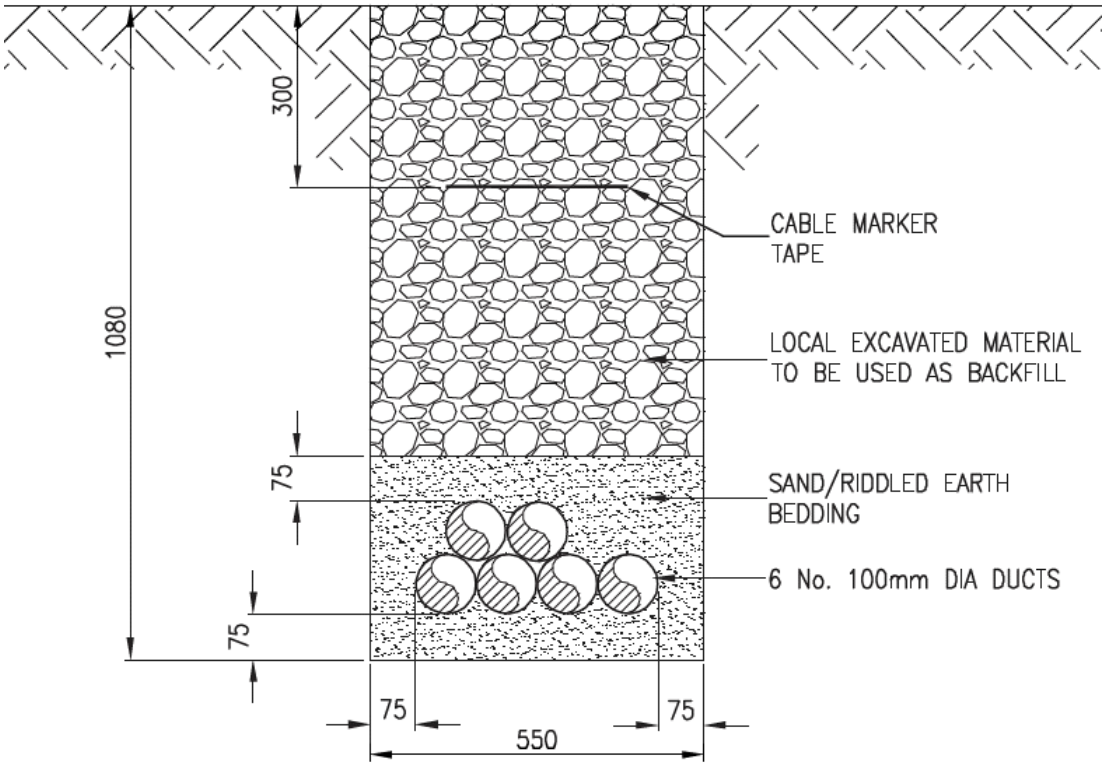


Figure 2-12: Typical cable trench detail (dimensions in mm)

2.2.7 Site Security and Fencing

Fencing will be provided around the Project site utilising a wire-mesh fence. In addition, two rows of barbed wire as an anti-climb guard will be mounted on top of the fence. The height of the fence, in addition to the barbed wire, will be at least 3 m. Fencing will be designed in accordance with national norms and standards and subject to regular inspection.

The minimum fencing requirements are as follows:

- Materials for all fencing will be hot dip galvanized with adequate corrosion protection.
- Fence posts and foundations shall be adapted to the ground conditions and at an interval of 3 m maximum.
- Struts will be installed at every 20 m maximum and at each angle.
- Fences will be 2.5 m high without the barbed wire and at least 3 m high including the barbed wire.
- Remote alarms will be installed.
- Security concept will be in line with Applicable Legislation and International Standards.

A gate will be installed at the site entrance onto the main access road. This will have a high resistance lock and lockable switch to enable the alarm system from outside of the Project. This will also have opening gate sensors.

At least 10 closed-circuit television (CCTV) cameras will be installed to oversee the whole Project Site during construction. The cameras will have remote controlling and web viewing for authorised personnel only. The cameras will have an Ingress Protection (IP) 65 rating to ensure that they are protected from contact and ingress of dust and will be regularly monitored and maintained.

2.2.8 Access Road

Qobustan road is the access road to the Project site from Gobustan city. It will be necessary for the road to be paved along its full length to allow HGV traffic (water trucks, repairs, supply or large equipment, etc) to access and so upgrading of existing sections of the road for Project purposes will be required. Further information is provided in Section 11.

- Figure 2-13 below sets out in further detail, the proposed Project access road. To summarise: The green line from the Highway to the Point 1 is an existing road going through the Gobustan settlement.
- The green line from Point 1 to Point 5 is part of existing newly constructed road to the Mud Volcano Recreation Center.
- The green line from Point 5 to the Point 15 is an existing old gravel road built for farmers and will be upgraded by the EPC Contractor.
- The green line from Point 15 to the Main Access Gate is a route of new access road to be constructed by the EPC Contractor.

Figure 2-13: Access Road Details

Within the site boundary, an internal road network will be constructed between the panel arrays to facilitate access during construction and for operational maintenance.

A typical internal road is shown in Figure 2-14.

Figure 2-14: Typical internal access track

If roads have to cross existing erosion features or ephemeral streams, then drainage features will be incorporated into the design to control overland flow and minimize erosion. If major gullies or other erosion features are crossed, culverts will be installed to convey stormwater under the road. This will be confirmed following appointment of the EPC Contractor and detailed design for the Project.

Typical road construction works include ground preparation, grading to desired slope and grade using cut-and-fill methods, placement and compaction of gravel where needed, excavation of a drainage ditch along uphill sides where appropriate, and placement of low berms on downhill sides where necessary. Any surplus topsoil will be stockpiled and protected from erosion, for use in future reinstatement. All off-road areas disturbed by construction equipment will be reclaimed where appropriate by planting seeds of native grasses. In addition, after the road is complete, native grasses will be established, where possible given the conditions, in any soil-based channels that are constructed alongside the road.

The source of material for road construction is currently unknown, in case there will be the need to source it from a nearby quarry. Clay materials at site are not recommended to be used as road and construction fill. When considering the sourcing of materials, IFC EHS Guidelines for Construction Materials Extraction[4] will be followed.

2.2.9 Drainage

Culverts and drainage channels may be constructed to divert storm water away from assets and infrastructure and into predetermined areas informed by the Project hydrological assessment. The actual size and location of culverts will be dependent on the specifics of the hydrology at the Project. The Project drainage system will ensure that runoff rates from the site remains at or less than current conditions.

2.2.10 Fencing and Security

The Project's site security measures will comprise a perimeter fence equipped with barbed wire to prevent intrusion. Intrusion detection and surveillance equipment will also be installed including lighting and CCTV systems.

[4] IFC (2007) EHS Guidelines for Construction Materials Extraction Final - Construction Materials Extraction.doc (ifc.org)

The Project site will be provided with security during construction. These aspects will have to be clarified with the EPC contractor. Security arrangements at the Project site will be developed in accordance with IFC Security Forces Guidance.[5] The Resolution of the Cabinet Ministers of the Republic of Azerbaijan No. 91 (31 March 2014) states that protection measures are only required for critical facilities with armed security required. Solar PV plants are not included and therefore it is not proposed that any security guard will be armed whilst working on the Project site.

2.3 Land Lease Agreement

The Project will be developed within State Lands, on Government premises in Garadagh and Absheron regions, under Acquisition of Lands for State Needs conditions. The land is classified as industrial, being allocated for use in the oil and gas industry by the Ministry of Energy (MoE). The land has been specifically allocated by the MoE for the development of a Solar PV Plant and a land lease agreement will be signed in April 2022 between the Company and the MoE. The land is currently being used by local farmers and herders for animal grazing activities during winter months.

Land access and current use considerations in terms of farmers / nearby farming entities has been explored under Chapter 12.

2.4 Project Schedule

It is understood that the Client's target date for full commercial operation of the Project is Q2/3 of 2023, with an assumed construction and installation phase of up to approximately 18 months. The Project is expected to have an operational lifetime of 23 years.

Table 2-4 sets out the proposed Implementation Schedule for the Project.

[5] IFC, Good Practice Handbook on the Use of Security Forces: Assessing and Managing Risks and Impacts, 2017. Report available at: https://www.ifc.org/wps/wcm/connect/ab19adc0-290e-4930-966f-22c119d95cda/p_handbook_SecurityForces_2017.pdf?MOD=AJPERES (28 Aug 2018)

Table 2-4: Project Schedule

Milestones	Date / Duration*
Signing Date (SD) of Project Agreements	6 April 2021
Achieve Financial Close and PPA Effective Date (ED)	06 June 2022
Issue Notice to Proceed (NTP) to EPC	ED – 06 June 2022
Completion of Site Preparation Works	NTP+6 – early December 2022.
Electro-Mechanical Completion of the PV plant	NTP+ 16 M – early October 2023
Connection Date.	NTP+ 16 M – early October 2023
Achieve Plant Early Operation Date	NTP+ 17 M early November 2023
Achieve Provisional Acceptance and issue of Provisional Acceptance Certificate (PAC)	NTP+ 18 M – early December 2023.
Achieve Final Provisional Acceptance and issue of Final Acceptance Certificate (FAC)	PAC + 24 M – early June 2024.
*The dates and schedule shall move accordingly if delayed	

2.5 Project Phases

The Project will entail a series of activities including the following.

2.5.1 Pre-Construction

The pre-construction phase will include carrying out power plant design review with reference to ESIA recommendations, planning for storm water drainage and containment, undertaking site preparation and grading, manufacturing-procurement of items and transporting the required components and construction equipment to site. No trees were observed within the Project boundary but any large shrubs within the vicinity and very close proximity to solar panels will be removed to prevent any of these casting a shadow on the solar-PV modules.

2.5.2 Construction

Construction of the Project will be carried out under an EPC contract strategy. The following activities will take place:

- Establishment of access roads to the Site (discussed above under section 2.2.9)
- Site preparation including fencing, clearing of bushes, pit filling, levelling and grading.
- Construction of site office and internal roads.
- Construction of temporary storage facilities and temporary compound (as described below).
- Establishment of storm-water drainage.
- Effluent, sanitation and sewerage disposal.
- Storage of paints and varnishes – Corrosion protection.
- Construction waste management
- On-site electricity supply (by means of diesel generator).
- Foundation laying for ground mounted structures.
- Storage of PV modules delivery and their installation.
- Laying of internal electrical connections.
- Construction of substation and office buildings.
- Installation of inverter and transformers.
- Inter-connection of the solar plant substation to the national electricity utility grid.

2.5.2.1 Temporary construction facilities

Temporary facilities to be used during construction will consist of a temporary compound inside the Project boundaries. The compound will include a parking area, a generator with fuel storage, and potentially temporary buildings to provide limited accommodation as portable cabins and support facilities for managers and workers, secure storage, site offices, and welfare and first aid facilities during construction. The capacity of the generator is below the threshold for requiring a permit under the EU Medium Combustion Plant Directive (MCPD)[6].

All these aspects will be refined and detailed further as part of the detailed design process once the EPC Contractor is appointed.

[6] Medium Combustion Plant (MCP) Directive - Environment - European Commission (europa.eu)

A fire protection system will be in place with certification and auditing in line with national legislation and the IFC EHS General Guidelines.

2.5.2.2 Concrete details

There are two potential cement manufacturers to be utilized during the construction phase. These are companies, NORM Cement and Holcim Cement, which are around 40 km north of the Project. Concrete producers selected include SPARK Beton, Azkontakt Beton and Azital. All of these companies currently work with NORM cement and are capable of producing traditional and special types of the concretes required by large scale projects in the country. Details regarding the source of concrete will be further confirmed following appointment of the EPC Contractor.

At least two settlement ponds will be included to clean mixers after concrete delivery. The location of these will be defined following appointment of the EPC Contractor. Mitigation measures and monitoring to ensure containment of cleaning water contaminated with concrete at settlement ponds will be included in the Hazardous Materials and Waste Management Plan.

2.5.2.3 Wastes and storage

Appropriate segregation of hazardous and non-hazardous wastes will be implemented. The minimum requirement for waste segregation shall be:

- Construction waste.
- Food waste.
- Hazardous – must be separate containers for each type of waste.

A licensed contractor will collect both hazardous and non-hazardous wastes from the site to be disposed in licensed waste disposal facilities. The relevant logistics company is responsible for collecting all packaging materials from the delivery and return with containers for further recycling at a licensed recycling plant.

The estimated volumes of waste generated during construction are set out in the table below.

Table 2-5: Estimated Volumes of Waste Generated during Construction

Material	Volume Generated	Site Office, Access & Temporary Compound	Installation of Solar Panels & Associated Facilities	Reinstatement
Non-Hazardous Wastes				
Soil.	0	0		
Concrete.	2 m^3	0		
Asphalt paving.	1 m^3	0		
Scrap steel.	5 tonnes	0	0	
Glass.	0		0	
Plastics.	5 m^3	0		
Packaging materials.	10 m^3		0	
Wood.	5 m^3	0		
General waste from construction workers.	100 m^3	0		
Hazardous Wastes				
Solvent waste.	1 litre	0		
Used and Spent oils.	100 litre	0		
Hydraulic fluid.	20 litre	0		
Resins and paints.	5 litre	0		
Waterproofing compounds.	10 litre	0		
Adhesives.	2 litre	0		
Waste chemicals used in the concrete forming process.	10 litre	0		
Clean up materials (such as spill kit wastes and rags) contaminated with the items listed above.	0.5 m^3	0		

Material	Volume Generated	Site Office, Access & Temporary Compound	Installation of Solar Panels & Associated Facilities	Reinstatement
Drums, containers and tins with remains of hazardous substance.	2 m^3	0		

The storage of fuel for the on-site construction vehicles and equipment will be secured in a temporary bunded facility to prevent the possibility of leakage and soil contamination. Bunding will be of impermeable construction and sufficient to contain 110% of the volume of liquids to be stored within.

Storage and sealing of other hazardous materials and wastes will take place in dedicated areas on site. There will be hazardous substances storage areas with special warning signs, instructing the staff on the rules of conduct in ordinary and emergency situations and utilization of wastes in accordance with national legislation and International Standards.

Sanitary waste will be collected in containers below portable toilets and transported to a registered waste disposal facility for disposal. Storage and handling procedures for oils and other chemicals will be required to minimize risk of pollution.

A Hazardous Materials and Waste Management Plan for construction which will be developed by EPC contractor. This plan will identify and implement proper waste management and will investigate opportunities for recycling and reuse of materials including procedures for disposal of redundant / broken panes, plastic, glass, oil and other waste types alongside outlining monitoring measures in accordance with Azerbaijan law and international best practices. The plan will also include procedures for handling and storing redundant/broken PV panels on the Project site (for example, ensuing these are bunded or stored in a covered area of the site).

The EPC Contractor will undertake reasonable efforts to find recycling companies within the country. There is the option for underperforming panels will be offered to local farmers as part of the Community Development Plan.

2.5.2.4 Construction machinery and equipment

Machinery and equipment likely to be used for construction activities includes: Excavator, Grader, Vibratory Roller, Water Sprinkler, Loader, Backhoe loader, Truck, Dozer, Tractor, Diesel generators, Pick-up Truck, Hydraulic Driving Machine for Installing Piles. In addition, Cranes and Telehandlers are expected for the unloading and storing of materials in the designated compound and storage areas. Electricity required during the construction phase will be supplied from on-site diesel generators.

In addition, different types of vehicles are expected to be used during construction phase of the Project:

- Light Goods Vehicles (LGVs) – contractors' vans, minibuses, private cars etc. estimated up to 1,600 Total Vehicle Movements during construction,
- Heavy Goods Vehicles (HGVs) – vehicles with a maximum rigid length of 12 m and a maximum articulated length of 16.5 m. Estimated up to 10,000 Total Vehicle Movements during construction.
- Abnormal loads – vehicles over 25 m in length or 3.6 m wide. Expected to be very limited in numbers.

Estimated traffic volumes are based on previous solar PV project experience and are to be confirmed once a construction strategy is available from the Project Developer.

2.5.3 Operation

The post-construction phase will include site remediation, clearance and deposition of debris off the site, restoration of areas where construction activities temporarily disturbed the environment, repairs and replacements of failed parts. Commissioning the Plant will be performed no later than 30 days and no earlier than three months prior to the Scheduled Commercial Operations Date.

The Project operation phase will require maintenance throughout the operation phase to ensure extended system lifetime, as well as compliance with manufacturer warranty and ensure efficiency in energy production. Routine maintenance activities include regular cleaning of panels and maintenance of electrical components, control equipment and access roads. Currently, the Project Company is planning to apply dry cleaning for PV panel cleaning. No wet cleaning is envisaged.

The PV module cleaning system will adopt full automatic control, and will comprise cleaning robots, docking stations, returning stations and bridges. The cleaning robot has a wind stow strategy and hook protection mechanism utilised during the cleaning process. The process is for dry cleaning therefore no water will be required. Furthermore, it has C4 corrosion protection and IP65 sand and dust protection. The proposed system is based on reliable and proven technology, and compatible with PV modules and track system.

2.5.4 Decommissioning

The Project is expected to have an economically useful lifespan of approximately 23 years and following this, the power plant infrastructure would either be decommissioned or upgraded (if a new license is granted) once it has reached the end of its economic life. Upgrading the PV power plant will consist of replacing old PV modules for new ones, increasing the total peak power of the plant (a process called "Repowering") or increasing the power of the plant by adding new elements such as trackers, PV modules or transformers.

If the plant is to be decommissioned, then the site should be returned to close to its original state. A Decommissioning and Site Restoration Plan will be developed prior to the decommissioning phase.

The components of a PV plant have an intrinsic value either for re-use or recycling. This value will cover the cost of decommissioning the plant and rehabilitating the site. Hazardous wastes will be disposed of in accordance with environmental guidelines required by the country; while the non-hazardous, like waste metals or plastics, will be delivered to respective recycling plants.

2.6 Water Resources

The main water requirement during construction would be water for concrete production in case of concrete foundations and dust suppression. An additional supply of potable water will be required for the workforce.

Construction workers must have easy access to a source of clean potable water. Drinking water must meet local or World Health Organisation (WHO) drinking water standards and

water quality must be monitored regularly[7]. IFC / EBRD workers' accommodation guidance[8] states that (dependant on weather conditions and accommodation standards), 80 to 180 litres of water per person per day should be made available. The anticipated maximum work force is around 420 at its peak and, with an average of 130 litres per person per day. At its peak workforce during construction there would be 54,600 litres/day required to cover the needs of the workforce (or 54.6 m^3 per day). On average considering the months where less workers are present, there would be around 24,115 litres required per day (or 24 m^3/day).

Assuming a construction phase of 18 months (24 m^3/day*30.4 days (average)*18 months) would result in a total water requirement of 13,133 m^3 for the workforce.

During construction (without consideration of water for consumption), it is estimated that 10,045 m^3 of water is required over the 18-month period. This averages at 18.3 m^3 per day however it is noted that some months will require greater water use than others.

There is no available groundwater or water supply sources available close to the area of Project. The nearest state water intake which belongs to Azersu (utility company) is around 11 km away from the site. Discussions are underway with the utility company and an official application is in progress. It has been confirmed with Azersu that there would be sufficient water capacity to supply the Project and existing demands.

It is therefore proposed that an underground water reservoir with capacity of 350 m^3 is constructed and water will be supplied by tankers to the Project from the intake. Drinking water will be purchased as bottled water from the local market.

Water resources consumption during operation is expected to be minimal, around 4 m^3 estimated per day in addition to bottled drinking water for any workers attending the Project site during operation. This is considered negligible compared to construction, since dry cleaning of solar panel is foreseen, and minimal water required for on-site personnel for potable use.

7 http://documents.worldbank.org/curated/en/604561468170043490/pdf/602530WP0worke10Box358316B01PUBLIC1.pdf

8 EBRD and IFC publication: Workers' Accommodation: Processes and Standards, 2009

2.7 Workforce and Transportation

During construction, the number of workers at site will vary according to the activities that are being undertaken. The number of people that are predicted to be employed during construction varies depending on the EPC Contractor however it is expected to reach a peak of 420 personnel. The construction workforce is expected to consist of a combination of nationals and expatriate workers, with the majority being locals preferentially sourced from the surrounding towns and villages .This includes technicians and low-skilled personnel who will receive various levels of training before starting work on the project. This includes basic training on HSE, labour management and, where required for specific job profiles, vocational training.

The Project will provide temporary accommodation for construction workers. This may be as portable cabins to be installed as temporary compounds within the fenced Project site area for a limited number of employees (no additional land required) and / or rented accommodation nearby. Any rented accommodation will be subject to an audit prior to construction to ensure it is in line of EBRD / IFC's Guide for Workers Accommodation[9] and will be upgraded as required prior to inhabitation.

It will be the responsibility of the EPC contractor to arrange for temporary accommodation. Workers could then potentially be expected to be accommodated within local towns. Temporary accommodation will meet international requirements in relation to space, water supply, adequate sewage and garbage disposal, protection against heat, cold, damp, noise, fire and disease-carrying animals, storage facilities, lighting and (as appropriate to size and location) access to basic medical facilities or personnel[10], in accordance with EBRD / IFC's guidance. COVID-19 management measures will be also put in place and will be constantly under review.

A dedicated Workers' Accommodation Plan will be developed prior to construction by the EPC contractor, following the EBRD / IFC guidance and including COVID-19 management measures. It is noted that no residential areas are located in close proximity of the Project site, thus no particular conflict with local population in terms of existing infrastructure, in particular the water and sanitation, electricity and transport systems, are envisaged.

[9] EBRD and IFC publication: Workers' Accommodation: Processes and Standards, 2009

[10] IFC publication: Project Developer's Guide to Utility-Scale Solar Photovoltaic Power Plants, 2015

The number of local people that are to be employed during operation is expected to be up to 50. A significant percentage is expected to be comprised of national people.

Transportation of solar PV components to Azerbaijan

The Company is in the process of running a competitive EPC tender and transportation arrangements will be led by EPC Contractor. For time being both land and water transport is considered. Two proposals are under evaluation:

- One option is proposed by SEPCO III utilizing ports from Shanghai to Poti (Georgia) and thereafter road transport. The duration of shipment from Shanghai port to Poti port is about 29 days normally. A group of trailers will be responsible for inland transportation from Poti to the Project site after customs clearance. The distance between Poti and the Project site is about 841 km by M2 highway. The duration for inland transportation is about 14 days normally. Access to site is then expected through Qobustan road.
- Second option is proposed by METKA which considers rail and road transport. Transportation will take place mainly by rail for the bulk items that are arriving from China (PV Modules, Tracker Parts, Inverters and Production Substations – more than 2.500 containers passing by Shanghai/ Tianjin/ Hefei - Xi'an/Jinan/ Jiaozhou - Horgos – Aktau – Baku, arriving in Gobustan area by truck) and by road from Europe (Greece, Romania and Italy) for cables, LV Panels, SCADA and CCTV/Security Equipment.

  Road Transportation from all European places of origin will take place through Turkey and Georgia to Azerbaijan (to the site by main M2 highway and Qobustan road). Access to site is then expected through Qobustan road.

The logistics activities are under the responsibility of the EPC contractor, in coordination with the Company, to be performed in compliance with Project Traffic and Transportation Management Plan (TTMP).

2.8 Main Project Alternatives Considered

ESIA best practice, IFC PS 1, EBRD PR1 and ADB Safeguard Policy require an assessment of Project alternatives as part of an environmental and social assessment. The section below sets out the main alternatives considered during the site selection process and demonstrates the reasoning for the decision to take forward the Project site.

2.8.1 Without the Project

The 'without solar PV farm' alternative would imply to maintain the status of the land as it currently stands which means that the current use of the site continues. From an environmental standpoint, a 'without project alternative' would place greater reliance on generating additional power from fossil fuel sources but also deny the local population potential opportunities associated with the Project. The achievement of Azerbaijan's 2025 vision and beyond for the inclusion of renewable energy electricity within its generation mix would not be supported. A 'With Project Alternative' is therefore recommended.

2.8.2 Site Selection

Selecting a suitable site is a crucial component of developing a viable solar PV Project. In general, the process of site selection must consider the constraints and the impact the site will have on the cost of the electricity generated. The main constraints that need to be assessed include[10]:

- Solar resource / Local climate / Topography.
- Available area / Land use / Accessibility.
- Local regulations/land use policy or zoning.
- Environmental designations.
- Geotechnical conditions.
- Geopolitical risks.
- Grid connection.
- Module soiling.
- Water availability.
- Financial incentives.

The following areas were initially considered for the Project – see Table 2-6 below.

Table 2-6: Project Site Alternatives

Site	Area	Location
1	60	5 km north-east from the Atbulag village – current Project site
2	61	The proximity of the Absheron National Reserve, 850 hectares in the nose of the Absheron peninsula.
3	62	2 km south of the Alat settlement, 2,600 ha

The following conclusions were reported[11]:

1. Marginal difference in terms of energy production has been calculated between sites. Therefore, energy was not considered the decisive factor while selecting the site. However, based on energy number the first priority would have been Area 61.
2. Area 60 or Area 62 were considered to have same level of production as very close to each other. Among these two; Area 60 was considered as priority, only because it is not located very close to the sea as Area 62 (i.e. marine environment and tendency of relatively high corrosion).
3. The technical difficulties were highlighted to find 400 MW of evacuation capacity of lines within short vicinity in case Area 60 and Area 62. In this respect, the selection of Area 61 and Area 60 were deemed to be reasonable.
4. As per the table above, Area 60 is further from settlements than Area 62 and considering the proximity of the nature reserve to Area 61, Area 60 was considered preferred.

A site visit was scheduled and performed on 27 January 2020 by Masdar on the finally selected Area 60. The visit was aimed to determine the suitability of the site for PV installation in several aspects such as: inclination, visual inspection of soil character, risk of flooding, soiling loss estimation, identification of any near shading and far shading objects. According to the Site Visit Report, major aspects such as accessibility, suitability of the soil, absence of nearby shading objects and a suitable grid connection at the selected site have been considered to be fulfilled.

In addition, the proposed layout has been selected with the aim of minimising conflicts with existing roads, residential areas and on-site constraints. Availability of suitable land (no ecologically sensitive areas, no cultural heritage and archaeological feature at the site, relatively flat, and located on State Land) and minimisation of impacts have been considered.

[11] Masdar, 2019. RES projects and Energy Estimates spreadsheet.

The outcomes of Wood's ESIA Scoping Study revealed farmers were using the Project site for grazing and driving livestock with private farms located nearby the site. Furthermore, there are recent and ancient cemeteries in proximity to the Project site as well as the national Gobustan Reserve. Mitigation set out within this ESIA will be committed to within the ESMMP, transposed into the Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP) as appropriate and adhered to by the Company and the EPC / O&M Contractor to reduce risks related to these receptors' location.

Additional detailed technical studies (i.e., Solar Resource Assessment, Meteo-Station Measurement Campaign, Albedo Study, Geotechnical Study, Hydrology Study, Power Flow and Grid Connection Study) have been or are being completed for the Project. The Meteo-Station Measurement Campaign and Power Flow and Grid Connection Study is on-going at present.

2.8.2.1 Solar Resource

An albedo measurement campaign on-site was conducted on October 2020, to determine the albedo characteristics of the area where the Azerbaijan PV 230 MW project (the Project) will be installed.

The Technical Advisor (TA) performed a quality analysis on the on-site measurements to identify any possible error or discrepancy. After this, the satellite-derived series were correlated and adapted with on-site measurements after applying a statistical approach, and after obtaining the correlation coefficients between both sources.

The table below shows the monthly and annual albedo values obtained in this study. The TA considers these values representatives of the Project location.

Table 2-7: Monthly and Annual Albedo Values

Month	Albedo (%)
January	19.5
February	20.3
March	19.5
April	19.4
May	18.8

Month	Albedo (%)
June	18.7
July	19.7
August	20.2
September	20.6
October	19.3
November	18.9
December	19.9
YEAR	19.6

Key outcomes of the study are summarized as follows:

- The TA has analysed two types of data sources: i) satellite estimations, and ii) measurements performed on-site.
- The site was mainly identified as clayey and herbaceous soil type, mostly free from dust and sand.
- Precipitation affects the albedo factor at this area, by generating puddles and by modifying the atmospheric conditions.
- An annual average value of albedo of 19.6% was obtained. This value is aligned with the expected ranges for this type of soil (natural clay soils), that oscillates between 15% and 35%. The site guarantees excellent solar irradiation.

2.8.2.2 Geotechnical Conditions

In July 2020, a Geotechnical Study of the site has been carried out. Main outcomes are summarized as follows:

- 34 geological exploration boreholes were drilled on this site (28 x 5.0 and 6 x 10.0 m). In the vicinity of these pits, 33 trial pits (3.0 m deep each) were excavated.
- Based on the results of chemical analysis of soil aqueous extracts, clay, clay loam mixtures resulted to be highly aggressive against ordinary portland cement and metal structures.
- It may be necessary to protect the concrete and building foundation against sulphate effect in the long term. The use of sulphate-resistant cement should be considered for design and applications.

- It is expected that the corrosion effect will be low for steel and similar materials in natural ground conditions. For the durability of such materials, protection against corrosion will be beneficial.
- Results suggested to not allow excavation work, which may affect the stability of the slope in the field surroundings, and to prevent flooding.
- Clay materials found in boreholes are not recommended to be used as road and construction fill.
- No cavities, lands liable to flooding, compressive soil, swelling soils, slope instability, erosion and similar geotechnical hazards are present in project area.
- Soils detected in the lithological section are of class II according to their seismic properties.
- There is no bearing capacity problem for shallow foundations and no needed soil improvement.
- No groundwater has been encountered during drillings, thus there is no liquefaction potential in the project area. Also, soil layers with liquefiable properties were not observed.
- No settlement issues in building foundations are expected. Most of the clays encountered in the boreholes are hard and incompressible.
- The project area consists entirely of hard clay layers. No issues are expected in driving the piles, particularly steel piles of 1.5-2.0 meters.

2.8.2.3 Hydrology and Flood Constraints

A Hydrology and Flood Risk Appraisal was completed by Wood in February 2021 to confirm the risks and provide recommendations and mitigation measures. The report is included within Appendix F of this ESIA. The report will be utilised to inform the detailed design of the Project which will be carried out by the EPC Contractor. The modelling outputs have demonstrated that the majority of the Project site is typically at low risk of flooding, with predominantly shallow (<0.15m) peak flood depths.

2.8.3 Technology Alternatives

In terms of technology, the conditions of the site are optimal for solar PV and unfavourable for other renewable technologies. The site does not possess sufficient wind resource and is not characterised by hydro or geothermal potential. Thermal power could potentially be the only technically suitable alternative, but its carbon footprint and the geographical location would make it both environmentally and economically disadvantageous. A 'Solar PV' technology option is therefore the most suitable for the site.

3 Legal and Institutional Framework

The ESIA study for the Project has been carried out within the framework of local, national and international environmental regulations and guidelines. This chapter outlines different institutional framework, policy and legislation requirements pertinent to the Project including the Azerbaijani regulations/institutions as well as international conventions that may be triggered by the Project.

3.1 Azerbaijan Institutional Framework

The ministries, agencies and institutions having key functions with responsibility for the environmental and social aspects of the Project are listed in the following table.

Table 3-1: Overview of Relevant Institutions at Government Level

Entity	Functions
Ministry of Ecology and Natural Resources (MENR)	Representing the central state authority overseeing the environmental protection. The Decree No.485/2001 sets forth provisions on duties and authorities, activities and organization of the MENR, which is seen as the executive central body in carrying out activities in the field of environment such as ensuring environmental protection, developing efficient use of natural resources, groundwater and mineral resources, observing hydrometeorology processes, improving soil fertility, to this end monitoring, surveying and mapping.
Ministry of Energy	Responsible for regulation of activities in the mining and energy industries of the Republic of Azerbaijan, covering the functions of both the abolished Ministry of Industry and Energy and Ministry of Fuel and Energy. The Ministry is responsible for the design and implementation of state policy and regulation in the energy sector, mainly concerning natural gas production, transportation, processing, distribution and supply; electricity generation, transmission, distribution and supply; and energy saving and efficiency. Moreover, the Ministry controls relevant state-owned enterprises. The Ministry has a dedicated department that is responsible for increasing the deployment of energy efficiency and renewable energy policies.
Ministry of Emergency Situations (MES)	It is a central executive body responsible for the civil defense and the protection of the population from natural and man-made disasters.

Entity	Functions
	Responsible for the management of natural disasters and industrial accidents and the implementation of safety rules in construction, mining and industry. MES (along with the MENR and other appropriate Ministries) require prompt notification in the event of an emergency, or accident. To be involved to issue permit to construct. It has a role during the permit process
Ministry of Health	It is the state institution controlling the sanitary-epidemiological situation in the country and regulation of health protection in the workplace. To be involved to issue permit to construct. It has a role during the permit process.
Tariff (price) Council	This is the implementing body for energy prices, service fees and collections across all regulated entities in the economy. The Council is chaired by the Ministry of Economic Development and has 12 members.
State Agency for Alternative and Renewable Energy Sources (SAARES)	Agency driving the development of the country's renewable energy resources and related projects, by preparing state policy, legal acts, regulatory documents and implementing state policy for creation and development of renewable energy sources. The status of the Agency was altered by a Presidential Decree No. 464 of 14 January 2019.
Energy Regulatory Agency (AERA)	This recently established Agency (December 2017) is the Public Legal Entity under the Ministry of Energy in charge of bringing utility services in line with the requirements of the market economy; achieving sustainable development by further improving control mechanisms; maintaining transparency and flexibility in energy supply; and ensuring accessibility of these services for entrepreneurs.
Ministry of Labor and Social Protection of Population	Government structure contributing to high-levelled execution of social policy strengthening and improvement of welfare state of country population.
State Tourism Agency of the Republic of Azerbaijan	The agency is the central executive body implementing the state policy and regulation in the field of protection of historical and cultural monuments located in the territories of the state reserves under its subordination. The State service is the executive body exercising state control on usage of immovable historical and cultural monuments (except State Historical-Architecture of "Icheri Sheher" and "Qala" State Historical Ethnographic Reserve) that are under state protection, restoration, reconstruction and protection.

Entity	Functions
Ministry of Culture (State Service for Protection, Development and Restoration of Cultural Heritage under the Ministry of the Culture of the Republic of Azerbaijan)	Governmental agency within the Cabinet of Azerbaijan in charge of regulation of the activities and promotion of Azerbaijani culture.
State Committee for Urban Planning and Architecture	Creates and maintains the state urban planning cadaster, ensures the preparation of the general layout and regional settlement schemes, schemes and projects of district planning, master plans of cities and other settlements, projects of residential areas, industrial centers, schemes and projects of engineering and communication lines of settlements and projects.
The State Land and Cartography Committee of Azerbaijan Republic (SLCC)	In charge of implementing land cadastral, monitoring and reforms; restoration and increasing of land productivity, setting territorial units in Azerbaijan Republic. The Department on Land structure, land reform and Work with regions under SLCC is responsible for coordination of Land acquisition and resettlement works with executive agencies.
Azerbaijan National Academy of Sciences, Institute of Geology	The main state research organization and the primary body that conducts research and coordinates activities in the fields of science and social sciences in Azerbaijan. Mud volcanoes have been studying at the Institute of geology.
District / Rayon Executive Authorities and Powers	They are representative offices of the President of Azerbaijan in places. Within the limits of their authority, they manage a city (district), adopt acts of regulatory and normative nature, dispose of state-owned lands, develop and implement programs for socio-economic development in the territories entrusted. The District / Rayon Executive Powers are responsible for the local management of state lands within the Rayons territories, and for the supervision of municipal land management.
Municipalities	They are a form of local self-government and non-state system for organizing the activities of citizens within the territories established by the laws of Azerbaijan. Municipalities, within their powers, design and implement programs for social protection and social development, economic development and local environmental programs.

Table 3-2: Overview of Relevant State Energy Entities

Entity	Main functions
Azerenerji JSC - Electricity generation and transmission	Electricity generation and transmission. Discussion with the Company ongoing defining Project's details and implementation.
Azerishiq JSC - Electricity distribution and supply	Electricity distribution and supply.
State Energy Agency of the Nakhchivan Autonomous Republic	Electricity generation, transmission, supply and distribution in the territory of the Nakhchivan Autonomous Republic of Azerbaijan (regional energy exchanging with Turkey and Iran).
Azalternativenergy LLC	Under the structure of the State Agency on Alternative and Renewable Energy Sources, this 100%-state-owned company was established to implement renewable energy projects; generate, transmit and distribute electricity from alternative and renewable energy; and provide construction and engineering services to both the government and the private sector.

3.2 National Environmental and Social Legislation

3.2.1 National EIA Main Legal Basis

The President of the Azerbaijan Republic introduced a Law on Environmental Impact Assessment (EIA) in June 2018, which was approved by the Decree No.193, dated 13 July 2018.

According to this Law, in order to coordinate the planned activity with the State Ecological Expertise of the MENR, it is necessary to develop and submit the EIA report to the representatives of MENR. The purpose of the Law "On EIA" is to create the legal basis for the functioning of the mechanism for the environmental impact assessment of public and private projects or the types of planned activities to ensure the prevention or reduction of negative impacts on the environment and public health at the earliest stages. The development of the EIA report is mandatory.

In accordance with the provisions of this Law, the EIA is carried out based on the following principles: an integrated environmental, social and economic assessment of the impact of the proposed activity on the environment and human health; ensuring the integrity, transparency and reliability of information about the environmental safety of the proposed activity; the preservation of ecological balance and biodiversity; not to exceed the impacts of the proposed activity on the environment to acceptable standards; forecasting of possible environmental consequences and assessment of the level of environmental risks; ensuring transparency in the EIA, informing the public and taking into account public opinion.

Specifically, the EIA report should include:

- Assessment of the initial and expected state of the environmental and socio-economic environment.
- Determination of the environmental impacts of construction, reconstruction and operation of facilities.
- Environmental Management Plan, combining a system of measures to reduce and mitigate environmental impacts.
- Environmental Monitoring Plan providing for the effectiveness of environmental measures.

3.2.2 Laws Applicable to the Project Purposes

The table below reports a summary of key environmental laws applicable to the Project purposes, including also the main laws dealing with energy sector in Azerbaijan.

Table 3-3: Key Laws applicable to and regulating the Project[12]

Law Title	Year	Description
Key environmental legislation		
Law on the Protection of the Environment, No. 678–IQ	1999 (last amendment in 2014)	This Law governs the legal, economic and social framework for environmental protection. The purpose of this Law is to guarantee environmental safety and the ecological balance of the environment, prevent the impact of socioeconomic and other activities, preserve biological diversity, and effectively manage the use of nature. This Law governs mutual relations between society and nature for the purpose of improving the quality of the environment, using and renewing natural resources efficiently, and enforcing environmental protection laws and legal procedures.
Law on Ecological Safety, No. 677-IQ	1999 (last amendment in 2013)	The main purpose of this Law is to establish legal basis for the protection of human life and health, environment, including atmospheric air, waterbodies, subsoil, land, vegetable and animal kingdom against risks originating from man's and natural impact thereon.
Law on Fauna, No. 675-IQ	1999 (last amendment in 2015)	This Law establishes the legal basis for protection of fauna in the Azerbaijan Republic, with the aim of ensuring preservation and rational use of all types of wild animals. It also describes issues of State inventory and monitoring, and economic and punitive regulations.
Law on Green Belts, No. 957-IVQ	2014	This Law aims at conservation of greens (trees, shrubs, flowers, grasses and planting materials) and green areas, also by defining the rights and obligations of state agencies, municipalities, legal entities and individuals.
Law on Specially Protected Natural Territories and Objects, No. 840-IQ	2000 (last amendment in 2015)	This Law determines the legal basis for protected natural areas and objects in Azerbaijan.

[12] Sources of information:
- http://www.aera.gov.az/en/legal-acts/laws
- "Renewables Readiness Assessment, Republic of Azerbaijan" (IRENA,2019);
- FAOLEX database: http://www.fao.org/faolex/country-profiles/general-profile/en/?iso3=AZE

Law Title	Year	Description
Law on Protected Areas, No. 540-IQ	2000 (last amendment in 2006)	This Law establishes legal basis for the organization, protection and management of protected areas, based on the following main objects: 1) conservation of biological diversity and ecosystem; 2) purposeful use of protected areas for scientific research, culture and education; 3) recreational use; 4) international cooperation (art. 3).
Law on Protecting the Atmosphere, No. 109-IIQ	2001	This Law has the purpose of protecting the atmosphere to ensure the people's right to live in a favourable environment and their access to accurate environmental information. It sets general requirements for air protection during economic activities, establishes norms for mitigating physical and chemical impacts to the atmosphere and establishes rules for the State inventory of harmful emissions and their sources.
Law on Water Code, No. 418-IQ	1997 (last amendment in 2015)	This Code regulates legal relations concerning the protection and use of water bodies in the Azerbaijan Republic, it sets property rights and covers issues of inventory and monitoring.
Law on Industrial and Domestic Waste, No. 514-IQ	1998 (last amendment in 2012)	This Law reports the State policy in environmental protection from industrial and household waste including harmful gases, wastewater and radioactive waste. It defines the rights and responsibilities of the State and other entities, sets requirements for the design and construction of waste-treatment installations, licensing of waste generating activities, and for the storage and transport of waste (including transboundary transportation), encourages the introduction of technologies for the minimization of waste generation by industrial enterprises.
Law on obtaining Information on the Environment, No. 270-IQ	2002 (last amendment in 2016)	This Law regulates relations arising in connection with the timely receipt of complete, reliable, timely information about the state of the environment and the use of natural resources from state authorities and local self-government, as well as from responsible persons.
Key health-social-cultural-economic legislation		

Law Title	Year	Description
Law on community health care, No. 360-IQ	1997 (last amendment in 2020, No. 71-VIQD)	This Law defines the basics of public health and the main principles of the healthcare system in Azerbaijan.
Law on Radiation Safety of the Population, No. 423	1998 (last amendment in 2020, No.1592-VQD)	This Law requires compliance with radiation safety in industrial enterprises. The law defines the basic principles of state policy in the field of radiation safety, as well as environmental standards that ensure the safety of workers and the public in territories exposed to potential impacts as a result of the use of radioactive sources.
Law on the Protection of Historical and Cultural Monuments, No. 470-IQ	1998 (last amendment in 2020, No. 1054)	This Law establishes the legal framework related to the protection, study and use of historical and cultural monuments in Azerbaijan.
Law on employment, No.1196-VQ	2018 (last amendment in 2019)	This Law establishes the legal, economic and organizational foundations of state policy in the field of employment assistance, as well as social protection of unemployed citizens.
Law on unemployment insurance, No. 765-VQ	2017 (last amendment in 2018)	This Law establishes the basic principles of relations in the labor market of Azerbaijan, the creation of new mechanisms for financing the lost wages of insured citizens, payment of compensations to them and strengthening social protection of the population.
Labor Code of the Azerbaijan Republic No. 618-IQ	February 1, 1999,	The Labor Code, through the relevant legal norms, defines the labor, social, economic rights of employees and employers, as well as the principles and rules for ensuring the right to work, rest, work in safe and healthy conditions, as well as other fundamental rights and freedoms of citizens of the republic.

Law Title	Year	Description
Law on State Guarantees of Equal Rights for Women and Men.	10 October 2006	The law aims to eliminate all forms of gender-based discrimination and ensure gender equality in the political, economic, social and cultural spheres. All human rights are guaranteed to women and men.
Key Land Management legislation		
The Constitution	Adopted on 1995	Recognizes the citizens' right to own, use and dispose property. It also recognizes three type of property ownership in Azerbaijan - state, municipal and private (Article 13). It guarantees that no one will be dispossessed of their property without their consent or decision by the court of law and that alienation of private property for state needs will be allowed only after payment of fair compensation to the owner (Article 29). The constitutional amendment adopted on 26th September 2016 with regards to Article 29 specifies (i) private land ownership entails social obligations and (ii) property right on land can be restricted by law for social justice and efficient use of land.
The Land Code dated June 25, No. 695-IQ	1999 (last amendment in 2019)	The Land Code is aimed at regulating land relations, fulfilling the obligations of landowners, users and tenant farmers and protecting their rights to land, creating conditions for the rational use of lands and their protection, restoration and improvement of land fertility. Article 101 states that, all damages caused by acquisition of land (compulsory purchase) or temporary detention, as well as limiting the rights of owners, users and lessees or deterioration of the quality of soil should be fully paid to landowners or users. In addition, costs derived from early termination of its obligations against third parties should also be paid to the affected person. Disputes relating to compensation, is being considered in a court in accordance with the procedure established by the legislation.

Law Title	Year	Description
The Civil Code	Adopted in 1999	Articles 246, 247, 248 and 249 include provisions for acquisition of lands for state needs. The Code requires the Decree on acquisition of lands for state needs should be registered in state real estate registration. It also states that Executive Agency should; a) send official notifications to all affected persons about land acquisition; b) pay full compensation to the affected persons within 90 days after the transaction agreement made; c) assist relocated people; and d) pay compensation for affected assets on the market rates (in case it is not possible to identify market rates, replacement prices is used). The Civil Code states as well that affected person can select one or more type of compensations. It also states that any rights to real estate must be registered with the State, and that land may be acquired from owners for state needs as approved by the relevant courts. It also states that the legality of ownership is established through the registration certificate issued by the Real Estate Land Registry Service based on the cadastral information (survey numbers) obtained from the State Land and Cartography Committee (SLCC) where the land is located.
The Land Acquisition Law	April 2010	Specifically address matters related to involuntary resettlement (IR), including the process and institutional arrangement for land acquisition, compensation and valuation, consultation requirements, entitlements of various categories of displaced persons and grievance mechanism. The law considers various categories of displaced persons, including those without state registration, renters, non-formal long-term users of land, and persons who have no legal rights on the land that they live in. The law entitles persons who have no legal rights on the land to resettlement assistance and compensation for their non-land assets. It includes provision of compensation for loss of business/income, transition allowance and transportation support, and compensation for loss assets based on replacement cost. As per the LAL, in case of physical displacement, the acquiring authority needs to send notification to DPs at least 60 days before resettlement.

Law Title	Year	Description
Law on Acquisition of Lands for State Needs	2011	The Decree stipulates additional provisions for the implementation of the Land Acquisition Law. It also assigns government agencies for each case of relevant executive body.
Law on land market, No.665-IQ	1999 (last amendment in 2018, No.1287-VQD)	This Law establishes general rules for land market relations in the Azerbaijan Republic and ensures the protection of property rights to land.
Law on the state land cadastre, land monitoring and land management No.593	December 22, 1998. The last amendment was introduced by the Decree of the President of the Azerbaijan Republic dated May 31, 2018, No.1156-VQD	This Law defines the legal framework for ordering the state land cadastre, land monitoring and land management works in the Azerbaijan Republic.
Law on land lease dated December 11, No.587-IQ	The last amendment was introduced by the Decree of the President of the Azerbaijan Republic dated May 31, 2018, No.1156-VQD	This law defines the legal framework for the lease of lands in state, municipal and private ownership, and lease relations in the Azerbaijan Republic. The law states that (Article 16) when the leased land is acquired for state needs, another land plot having a same size and a same quality can be provided to lessee. Losses incurred in this land shall be paid in accordance with the legislation.
Law on the management of municipal lands No.160-IIQ	June 29, 2001. The last amendment was introduced by the Decree of the President of the Azerbaijan Republic dated June 19, 2020, No.138-VIQD	This Law regulates the general rules for the transfer of municipal lands to ownership, use and lease, taking into account the peculiarities of their management, legal relations in the field of their use and protection.
Cabinet of Minsters' Resolution No.45 24	2012	Approving of guidelines for preparation of Resettlement Plan and Resettlement Guideline.

Law Title	Year	Description
Rules for assigning lands to categories and transferring them from one category to another", approved by Decision No. 10 of the Cabinet of Ministers of the Republic of Azerbaijan	2017	Agricultural lands (arable lands) are specially protected and their transfer to other categories for non-agricultural purposes is permitted in exceptional cases in accordance with the Land Code of the Republic of Azerbaijan and on the basis of the requirements of the "Rules for assigning lands to categories and transferring them from one category to another".
Key laws relating to Energy Sector		
Law on Energy Resources Utilization, No. 94-IQ	1996	The Law on Energy Resources Utilisation defines the legal, economic and social fundamentals for State policy on the use of energy resources as well as the main directions for policy implementation. The Law includes provisions on the certification and standardisation of energy consuming installations, facilities, etc..
Law on Energy, No. 541-IQ	1998	This law covers the regulation of the exploration, exploitation, production, processing, storage, transportation, distribution and use of all energy materials and products, including gas.
Law on Power Industry, No. 459-IQ	1998	The Law on Power Industry provides the legal background for the generation, transmission, distribution and sale of electricity and heating, aiming at ensuring rational utilisation of power resources as well as environmental protection. The Law appoints the Ministry of Energy as the authority responsible for licensing and regulating electricity generation, transmission, distribution, sale, and import–export activities.
Law on Heat and Electric Power Plants, No.784-IQ	2000 (last amendment in 2019)	This Law determines the legal framework for the design, construction and operation of power plants including independent power plants. Any natural or legal entity has the right to construct, rehabilitate and operate power plants, and activities related to “industrial power plants” (i.e. excluding small power plants) must be licenced by the Ministry of Energy. The Law also provides for the process and conditions of negotiated access and connection of such licenced facilities to the grid

3.2.3 Renewable Energy Related Laws

Azerbaijan does not have a dedicated, comprehensive law governing the various aspects of renewable energy development. However, the existing legal and regulatory framework for energy also consider specific provisions for the use of renewable energy, such as the following secondary laws aimed at promoting the use of renewable energy through special concessions[13].

- The *State Program on the Use of Alternative and Renewable Energy Sources*, adopted in 2004, aims to determine the potential of alternative energy sources in the production of electricity, increase the efficiency of national energy sources, guarantee national energy security, decrease CO_2 emissions, and support job creation via renewable energy sector development.
- The amendments of March 2014 to the two Cabinet of Ministers decrees *Rates of custom duties on export–import operations in Azerbaijan Republic* and *List of goods exempted of VAT imported to Azerbaijan Republic territory* state that the import of equipment, facilities, parts and tools used in the renewable energy industry and in achieving energy efficiency are exempt from customs duties and VAT.
- The Decree of the Cabinet of Ministers *On determination of electricity production and power limits for the commissioning of electrical installations* (No. 482/2016) states that special permits for alternative and renewable energy power plants are required only for power plants with a capacity of more than 150 kW, and for hydropower plants and biogas power plants with a capacity of more than 500 kW.

As shown in the following figure, the permitting procedure for renewable energy in Azerbaijan is complex, as involving fragmented division of responsibilities across Ministries and local administration.

[13] "Renewables Readiness Assessment, Republic of Azerbaijan" (IRENA,2019).

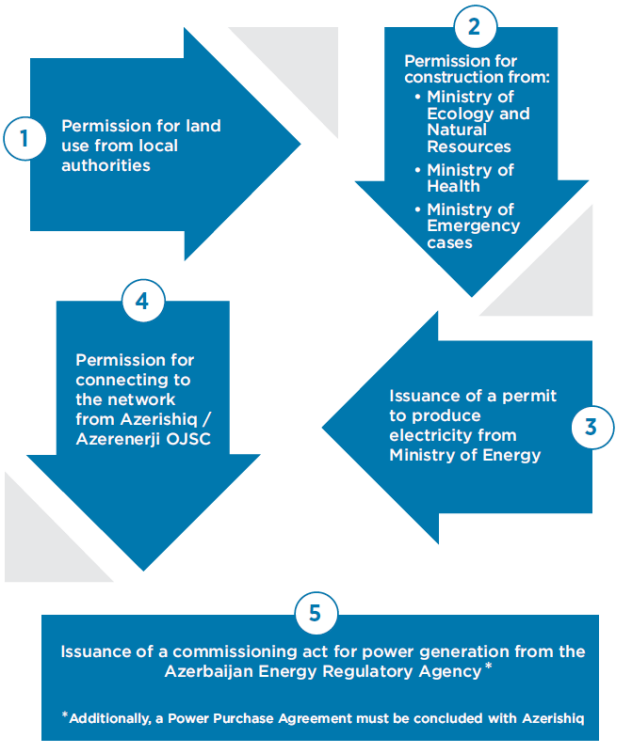


Figure 3-1: Overview of Existing Renewable Energy Permitting Procedures (IRENA, 2019)

3.3 International Ratified Conventions

The following table reports the list of the main international and regional conventions which Azerbaijan has ratified over years. Many of the international ones are incorporated into the EPs, IFC PSs, EBRD PRs, ADB Safeguard Policy and associated guidance.

International and Regional Convention	Year of Ratification
International Labour Organization (Fundamental)[14]	
C029 - Forced Labour Convention, 1930	1992
C087 - Freedom of Association and Protection of the Right to Organise Convention, 1948	1992
C098 - Right to Organise and Collective Bargaining Convention, 1949	1992
C100 - Equal Remuneration Convention, 1951	1992
C105 - Abolition of Forced Labour Convention, 1957	2000
C111 - Discrimination (Employment and Occupation) Convention, 1958	1992
C138 - Minimum Age Convention, 1973 *Minimum age specified: 16 years*	1992
C182 - Worst Forms of Child Labour Convention, 1999	2004
Pollution Prevention	
Stockholm Convention on Persistent Organic Pollutants	Acceded in 2004
Convention on the Transboundary Effects of Industrial Accidents*	Acceded in 2004
Basel Convention on the Control of Transboundary Shipment of Hazardous Wastes	2001
Kyoto Protocol, 1997	Acceded in 2000
UN Convention on the Protection of the Ozone Layer (Vienna Convention)	Acceded in 1996
Montreal Protocol on Substances that Deplete the Ozone Layer, 1987	Acceded in 1996
United Nations Framework Convention on Climate Change, 1992	Acceded in 1992

[14] International Labour Organisation (ILO): Ratifications for Azerbaijan. Webiste: https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:11200:0::NO::P11200_COUNTRY_ID:102556

International and Regional Convention	Year of Ratification
UNECE Geneva Convention on Long-Distance Transboundary Air Pollution*	2002
UN Convention on Control of Transboundary Movements of Hazardous Wastes and their Disposals	2001
International Carriage of Dangerous Goods by Road*	2000
Espoo Convention* (To promote environmentally sound and sustainable development through the application of ESIA, especially as a preventive measure against transboundary environmental degradation)	Acceded in 1999
Aarhus Convention* (To guarantee the rights of access to information, public participation in decision-making and access to justice in environmental matters)	Acceded in 2000
Biodiversity Protection	
UNESCO Convention on Wetlands of International Importance especially as Waterfowl Habitat / RAMSAR Convention	2001
UN Convention on Biological Diversity, 1992	2000
Bern Convention on conservation of wild flora and fauna and their natural habitats	In force since 2002
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	1999
Cultural Heritage	
Convention for the Safeguarding of the Intangible Cultural Heritage. Paris 2003	2007
Convention concerning the Protection of the World Cultural and Natural Heritage. Paris, 16 November 1972.	1993
European Convention on the Protection of the Archaeological Heritage	2000
Human Rights	
European Convention for the Protection of Human Rights and Fundamental Freedoms	2002
UN Convention on the Elimination of All Forms of Discrimination against Women	1995

International and Regional Convention	Year of Ratification
UN Convention against Torture and Other Cruel, Inhuman or degrading treatment or punishment	1996
UN International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families	1999
UN International Covenant on Economic, Social and Cultural Rights	1992
UN Convention on the Rights of the Child / Protocol Faculty in connection with the participation of children in armed conflicts	1992/2002
UN Convention on the Elimination of All Forms of Racial Discrimination	1996
Regional Framework Convention for the Protection of National Minorities	2000
UN Convention on the Rights of Persons with Disabilities	2009
UN International Covenant on Civil and Political Rights	1992
The high-level conference on the future of the European Court of Human Rights. Interlaken Declaration	2010
The high-level conference on the future of the European Court of Human Rights. Izmir Declaration	2011
The high-level conference on the future of the European Court of Human Rights. Brighton Declaration	2012
*UNECE agreement; Azerbaijan became a member of the UNECE in 1993. The major aim of the UNECE is to promote pan-European integration through the establishment of norms, standards and conventions.	

3.4 International Best Practise Policies, Regulations and Guidelines

International lenders who are signatories to the EPs require projects that they finance to meet international standards. Beyond Azerbaijan's legal requirements, lenders requirements are detailed in the following documents:

- Equator Principles 4, 2020 (new release of EP4 in July 2020 to be implemented by EPFIs from 01 October 2020).
- IFC Performance Standards on Social and Environmental Sustainability, 2012.
- EBRD Environmental and Social Policy, 2019.
- ADB Safeguard Policy Statement, 2009.
- ADB Social Protection Strategy, 2018.
- ADB Gender and Development Policy, 1998.

- ADB Access to Information Policy, 2018.
- JICA Guidelines for Environmental and Social Considerations. 2022.

Guidelines followed include:

- World Bank Group Environmental, Health and Safety General Guidelines, 2007.
- World Bank Group Environmental, Health and Safety Guidelines for Electric Power Transmission and Distribution, 2007.
- IFC Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets, 2007.
- IFC publication: Project Developer's Guide to Utility-Scale Solar Photovoltaic Power Plants, 2015.
- BirdLife International's Solar Energy Guidance.
- IFC/EBRD Workers' Accommodation: Processes and Standards, 2009.
- IFC Stakeholder Engagement - Good Practice Handbook for Companies Doing Business in Emerging Countries.
- IFC Good Practice Handbook to Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets, 2013.
- EBRD Guidance Note on Grievance Mechanism, 2012.

These are all specific policies, procedures, strategies and regulations designed for promoting sustainable development. A detailed review process is required prior to final approval of financing for the Project, detailed environmental guidelines, detailed health and safety requirements, procedures for social impact assessment and public consultation and information disclosure and many other issues, associated with project construction, operation and decommissioning. Many of the mitigation measures described in later sections of this ESIA are based on these requirements.

Further detail relating to the EPs, IFC PSs, EBRD PRs and ADB Social Safeguard Policy is provided below.

3.4.1 Equator Principles

The EPs apply to all new project financings with total capital costs of USD10 million or more across all industry sectors globally. On 18 November 2019, the Equator Principles Association published version four of the Equator Principles (EP4). The changes, which take effect on 01 July 2020 to be implemented on any new Projects signed on/after 01 October 2020, include substantive new requirements in relation to human rights, climate change and impacts on Indigenous Peoples.

The EPs represent a framework for project financing, which is underpinned by the IFC Performance Standards (PSs). The extent to which the EPs has generally be applied to a project depends on whether the country in which the project is located is "Designated" or "Non-Designated". While EP4 retains the concept of 'Designated Countries' and requires projects in those countries to be evaluated for compliance against host country laws, it no longer assumes that those laws will necessarily meet relevant requirements in relation to environmental and social assessments, management systems and plans, stakeholder engagement or grievance mechanisms. EP4 retains the language of its predecessor, making clear that host country laws represent the minimum standard, and require lenders to evaluate specific risks of the Project to determine whether the IFC PS could be used as guidance to address those risks, in addition to host country laws.

Projects within Non-Designated countries such as Azerbaijan are required to follow the standards and guidelines as set out in the IFC PSs and Environmental Health and Safety Guidelines.

3.4.2 IFC Performance Standards

The IFC PS are detailed below:

- IFC PS1 – Assessment and Management of Environmental and Social Risks and Impacts.
- IFC PS2 – Labour and working conditions.
- IFC PS3 – Resource Efficiency and Pollution Prevention.
- IFC PS4 – Community Health, Safety, and Security.
- IFC PS5 – Land acquisition and involuntary resettlement.
- IFC PS6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources.
- IFC PS7 – Indigenous peoples.
- IFC PS8 – Cultural heritage.

PS 1 establishes the importance of assessment to identify the environmental and social impacts associated with development, effective community engagement and project information disclosure and consultation with local Project affected communities and environmental and social management measures. This ESIA has therefore been carried out to meet the requirements of IFC PS1.

The remaining IFC PSs set out objectives and requirements to avoid and minimize potential environmental and social adverse effects on the environment and to offset/compensate any residual effects. PS 2 to 8 have therefore been considered as part of the assessment process and discussed where relevant within the topic specific sections of the ESIA.

3.4.3 EBRD Performance Requirements

EBRD-financed projects are expected to be designed and operated in compliance with good international practices relating to sustainable development. As a signatory to the EPs, EBRD is committed to ensuring that projects meet EU environmental principles, practises and substantive standards where these can be applied at project level, regardless of the geographic location[15]. To assist projects with achieving this, EBRD have defined 10 performance requirements covering the key areas of environmental and social issues and impacts. These include:

- EBRD PR1 – Assessment and management of environmental and social risks and impacts.
- EBRD PR2 – Labour and working conditions.
- EBRD PR3 – Resource efficiency and pollution prevention and control.
- EBRD PR4 – Health, safety and security.
- EBRD PR5 – Land acquisition, restrictions on land use and involuntary resettlement.
- EBRD PR6 – Biodiversity conservation and sustainable management of living natural resources.
- EBRD PR7 – Indigenous peoples.
- EBRD PR8 – Cultural heritage.
- EBRD PR9 – Financial intermediaries.
- EBRD PR10 – Information disclosure and stakeholder engagement.

[15] EBRD, Environmental and Social Policy (2019), https://www.ebrd.com/news/publications/policies/environmental-and-social-policy-esp.html

3.4.4 ADB Safeguard Policy Statement

ADB's Safeguard Policy Statement (SPS) (2009) builds on three previous safeguard policies on the environment, involuntary resettlement and indigenous peoples, bringing them into one policy to more comprehensively address environmental and social impacts and risks.

The SPS aims to promote sustainability of project outcomes by protecting the environment and people from projects' potential adverse impacts by avoiding adverse impacts of projects on the environment and affected people, where possible; minimizing, mitigating, and/or compensating for adverse project impacts on the environment and affected people when avoidance is not possible; and helping borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks[16].

3.4.5 JICA Environmental and Social Requirements

JICA standards include:

- The Basics of Environmental and Social Considerations (August 2013)[17].
- JICA Guidelines for Environmental and Social Considerations (ESC Guidelines) (January 2022).[18]

The ESC Guidelines were revised in January 2022. The revision aims to achieve international standards of environmental and social considerations, and to enable faster and practical project formulation as well as implementation.

The main changes have been made taking into account the environmental and social policies of multilateral development agencies such as the World Bank, and include: efforts to estimate and disclose the amount of total greenhouse gas emissions as a response to climate change; changes to disclosure of environmental assessment reports for the purpose of early dissemination to stakeholders and early achievement of positive development impacts; strengthening of efforts related to local stakeholder consultations.

[16] https://www.adb.org/documents/safeguard-policy-statement (2009)

[17] Microsoft Word - The Basics of ESC.doc (jica.go.jp)

[18] JICA Guidelines for Environmental and Social Considerations (January 2022) | Our Work | JICA

The objectives of the Guidelines are to encourage project proponents to have appropriate environmental and social considerations, as well as to ensure JICA's proper implementation of support for and review of environmental and social considerations. The Guidelines outline JICA's responsibilities and procedures, along with its requirements for project proponents, in order to achieve these objectives.

4 Impact Assessment Methodology

The following section introduces the impact assessment methodology proposed for the Project ESIA study.

4.1 Project Area of Influence

The IFC PS1 defines the Area of Influence (AoI) as 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.*

EBRD PR 1 states that: *'environmental and social impacts and issues will be appraised in the context of the project's area of influence. This area of influence may include one or more of the following, as appropriate:*

(i) The assets and facilities directly owned or managed by the client that relate to the project activities to be financed (such as production plant, power transmission corridors, pipelines, canals, ports, access roads and construction camps).

(ii) Supporting/enabling activities, assets and facilities owned or under the control of parties contracted for the operation of the clients business or for the completion of the project (such as contractors).

iii) Associated facilities or businesses that are not funded by the EBRD as part of the project and may be separate legal entities yet whose viability and existence depend exclusively on the project and whose goods and services are essential for the successful operation of the project.

(iv) Facilities, operations, and services owned or managed by the client which are part of the security package committed to the EBRD as collateral.

(v) Areas and communities potentially impacted by: cumulative impacts from further planned development of the project or other sources of similar impacts in the geographical area, any existing project or condition, and other project-related developments that can realistically be expected at the time due diligence is undertaken.

(vi) Areas and communities potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location. The area of influence does not include potential impacts that would occur without the project or independently of the project'.

ADB's Safeguard Policy states that:

"This area of influence encompasses (i) the primary project site(s) and related facilities that the borrower/client (including its contractors) develops or controls, such as power transmission corridors, pipelines, canals, tunnels, access roads, borrow pits and disposal areas, and construction camps; (ii) associated facilities that are not funded as part of the project (funding may be provided separately by the borrower/client or by third parties), and whose viability and existence depend exclusively on the project and whose goods or services are essential for successful operation of the project; (iii) areas and communities potentially affected by cumulative impacts from further planned development of the project, other sources of similar impacts in the geographical area, any existing project or condition, and other project-related developments that are realistically defined at the time the assessment is undertaken; and (iv) areas and communities potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location. The area of influence does not include potential impacts that might occur without the project or independently of the project."

The AoI must firstly be defined in order to determine how widely the IFC PSs, EBRD PRs and ADB Safeguard Policy are to be applied and encompasses Associated Facilities and 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.

In principle, this extends to the primary Project site and related facilities: the solar PV array, and access road (EPC Contractor responsibility) considered to be part of the primary Project site and related facilities, collectively the Project. The following have been used to determine the area of influence:

- Physical footprint of the Project and buffer of 5 km - no defined AoI for Solar PV projects is recommended by international guidelines e.g. IFC. Best practice is to consider generally 5 km to evaluate any potential impacts for environmental and social receptors.
- Area of 100 m either side of roads and any access tracks.

For the purpose of the assessment, a Study Area has been defined as the area that needs to be studied in the ESIA process, in order to adequately understand and characterize the Baseline. The Study Area encompasses the Area of Influence, and in this case, it has been considered to extend further up to 10 km, depending on baseline data availability for each topic. For example, if data was limited, this area was extended out to 10 km radius.

Closer consideration has been given to the development of the OHL for which the Project will connect to (along with other projects in the area). In this respect, additional baseline information is provided for this cumulative development in the relevant topic chapters covering the OHL which expands beyond the identified study area. Appendix B details key features identified along the OHL route.

4.2 Assessment of Impacts

Several criteria were used to determine whether or not a potential impact of the Project could be considered 'significant'. These are outlined with reference to specific environmental and social issues in the subsequent topic chapters of this ESIA. Wherever possible, a quantitative assessment of the impacts was undertaken. Where this was not possible, a qualitative assessment of impacts was carried out, based on existing information available for the site and the surrounding study area, and experience with other solar PV developments.

The ESIA covers the direct impacts and any indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, reversible and irreversible, beneficial and adverse impacts of the Project.

Where relevant, the anticipated impact was compared against appropriate legal requirements and standards. Where no such standards exist, assessment methods involving interpretation and the application of professional judgement were employed. The assessment of significance in all cases took into account the impact's deviation from the established baseline conditions and the sensitivity of the environment.

4.2.1 Methodology for Assessing Environmental Impacts

A general method for grading of the significance of environmental impacts was adopted to ensure consistency in the terminology of significance, whether for a beneficial or an adverse impact. The two principal criteria determining significance are the sensitivity of the receptor and the magnitude of the change arising from the Project, as shown in Table 4-1 below. A number of best practise sources of guidance were used to inform the assessment process[19,20,21,22].

[19] Carroll and Turpin (2009) Environmental Impact Assessment Handbook: A Practical Guide for Developers and Communities 2nd Edition.

[20] IEMA (2004) Guidelines for Environmental Impact Assessment

[21] European Union (2017) https://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf

[22] Scottish Natural Heritage (2018) https://www.nature.scot/handbook-environmental-impact-assessment-guidance-competent-authorities-consultees-and-others

Table 4-1: Determination of Environmental Impact Significance

		Sensitivity of Receptor		
		High (e.g. international or national protection)	***Medium*** (e.g. regional or local protection**)**	***Low*** (e.g. no protection)
Magnitude of Change	**High** (e.g. >75% of area or receptor affected)	Major (H, H)	Major (H, M)	Moderate (H, L)
	Medium (e.g. 25-75% of area or receptor affected)	Major (M, H)	Moderate (M, M)	Minor (M, L)
	Low (e.g. 5 to 25% of area or receptor affected)	Moderate (L, H)	Minor (L, M)	Negligible (L, L)
	Very Low (e.g. >0, but <5% of area or receptor affected)	Minor (VL, H)	Negligible (VL, M)	Negligible (VL, L)
	No Change	None (NC, H)	None (NC, M)	None (NC, L)

Table 4-1 shows that the significance of impacts was classed as major, moderate, minor, negligible or none; and either positive (beneficial) or negative (adverse). This categorization is widely recognised and accepted in the field of ESIA and those general principles will be applied within the ESIA. Where appropriate, additional topic-specific assessment methods and criteria for determining significance are utilised and discussed in the subsequent receptors' specific chapters.

Potentially significant effects can then be identified for further analysis. Effects are considered to be 'significant' where the assessment indicates a moderate effect or higher.

Another consideration is the duration of the impact, whether the impact would be temporary or permanent, and if they were temporary whether they would be short-, medium-, or-long term. Defining the duration of the impact can be subjective, depending on the receptor. For instance, following temporary use of land during construction, it may then take many years for the area of grassland to re-establish, particularly in arid environments. Similarly, although in ecological terms this period may not be a long time, for the people who use the land for pasture, this period could be significant in relation to

their lifetime and could therefore be considered permanent. Table 4-2 defines the criteria for assessing the duration of impact.

Table 4-2: Duration of Impacts

Nature of Change	Duration	Definition / Description
Temporary	Short-term	Impact continues during construction (1-2 years) and up to 1 year following construction.
	Medium-term	Impact continues 1-5 years following construction.
	Long-term	Impact continues 5-10 years after construction.
Permanent		Due to the length of time period for human beings, impacts over 10 years can subjectively be defined as permanent.

As mentioned, any alternative approaches for assessing project impacts from an environmental standpoint are separately described where applicable in Chapters 5 to 14.

4.2.2 Scope and Methodology for Assessing Social Impacts

The objective of the social impact assessment is to identify major risks to social and economic conditions in the area of the proposed action and to assess impacts of construction and operation of the Project on socio-economics following recognised good practise guidance[23,24,25]. The impacts can be direct and indirect, intended and unintended, positive and negative. For significant impacts, the Developer would be required to implement a variety of mitigation measures, and these are discussed within Chapter 16 (Environmental and Social Management and Monitoring Plan).

In general, the social impact assessment process involves the following major tasks:

- Identifying types of adverse and beneficial impacts of the proposed action.

[23] Centre for Good Governance (2006)

[24] World Bank (2003)

[25] Mackenzie Valley Environmental Impact Review Board (2007)

- Assessing the level of socioeconomic risks in terms of frequency (how likely is it to happen) and consequences.
- Assessing the acceptability of the risks.
- Introducing mitigation measures to reduce risks to acceptable level.

The process typically addresses the following issues:

- **Demographics:** Changes in local population size, emigration/immigration in the area, migration of people in search of work, and other issues.
- **Economic issues:** Supply chain impacts, local sourcing opportunities, potential impacts on local markets for goods and services, employment opportunities for construction, operation and decommissioning phases of the Project.
- **Health issues:** Risks of new diseases to indigenous communities, impacts on health of operations personnel and local communities, impact of local diseases on workers.
- **Social infrastructure**: Adequacy of health care and education facilities, transport and roads, power supply, fresh water supply to support project activities and personnel as well as the local communities.
- **Resources**: Land use changes, increased access to rural or remote areas, use of natural resources.
- **Community aspects**: Changes from traditional lifestyles, community cohesion, attitudes and behaviour, perception of risk.
- **Vulnerability**: Potential vulnerabilities due to existing and added project stresses, disproportionate impacts, gender, influx and impacts on livelihoods.
- **Cultural**: Issues associated with sites that have archaeological, historical, religious, cultural, or aesthetic values.
- **Social equity**: Local social groups who will gain or lose as a result of the Project or operation.
- **Human rights:** Actual and potential adverse human rights impact as a result of the Project. This is incorporated into the social assessment.

As with environmental impacts, a general method for grading the significance of socio-economic impacts was adopted to ensure consistency in the terminology of significance, whether for a beneficial or an adverse impact. The two principal criteria used were the nature of the impact and the magnitude of the change arising from the Project, as shown in Table 4-3. Further specific details relating to the social assessment methodology and baseline gathering are set out in Chapter 12.

Table 4-3: Determination of Social Impact Significance

Magnitude of Change	Nature of Impact		
	Avoidance	*Disruption / Habituation*	*Permanence*
Negligible	No avoidance needed.	Not noticeable under normal conditions.	Not noticeable.
Minor	Mitigation of design change prevents impact(s).	No effect on daily life or routine of affected party.	Ephemeral: <1 year.
Moderate	Mitigation or design change reduces impact.	Possible initial change on daily life/routine, rapid habituation reduces to below nuisance level.	Temporary: recovery to pre-existing conditions after one or a few years (e.g., after construction).
High	Mitigation or design change cannot significantly reduce impact(s).	Requires change to daily life or routine activities.	Permanent: life of solar farm, or beyond.

4.2.3 Cumulative Impacts Assessment

Cumulative impacts are those effects that may result from the combination of past, present or future actions of existing or planned activities. While a single activity may itself result in an insignificant impact, it may, when combined with other impacts (significant or insignificant) in the same geographical area and occurring at the same time, result in a cumulative impact that is significant.

Good practice requires that, at a minimum, project sponsors assess during the ESIA process whether their development may contribute to cumulative impacts and/or may be at risk from cumulative effects on valued environmental and social components they depend on. This will be done through a rapid cumulative impact assessment during the ESIA process and will follow guidelines under IFC PSs requirements.

4.2.4 Mitigation and Enhancement

Where significant impacts are identified, mitigation measures are then developed. These measures are intended to avoid, reduce, compensate, and/or remediate adverse impacts, or to enhance potentially beneficial impacts. Wherever possible, this is undertaken as part of the Project design, so the measures will feed back into impact assessment.

The mitigation and enhancement which should be undertaken as part of the Project are set out within relevant sections of Chapters 5 to 14 and within Chapter 16 (environmental and social management and monitoring measures). These measures can then be applied in order to manage different phases of the Project.

4.2.5 Assessment of Residual Impacts

Following the identification of mitigation measures to address significant adverse effects, an assessment of the significance of any residual impacts (i.e. those remaining after mitigation) was completed.

4.2.6 Monitoring

Where there is uncertainty over the potential significance of an impact, mitigation may include monitoring of that impact to determine whether additional measures are required. It is recommended that Project monitoring be described in a corresponding Environmental and Social Management and Monitoring Plan (ESMMP), a framework ESMMP accompanies this ESIA. The Project Developer will ultimately be responsible for developing an ESMMP for the Project.

4.3 ESIA Scope Exclusions

It is proposed that air quality impacts be scoped out of the ESIA due the fact that the Project will have negligible emissions during normal operation. This is with the exception of dust emissions which are considered under relevant chapter topics such as transport and access, soils and biodiversity. Mitigation to alleviate these impacts is set out within these relevant chapters and included within the ESMMP to be transposed into the Construction Environmental Management Plan (CEMP) and Operational Environmental Management Plan (OEMP) as applicable.

Additionally, the EPC contractor will develop a Traffic and Transportation Management Plan (TTMP), where aspects related to dust management will be addressed. Dust management measures will also be incorporated into the CEMP.

5 Landscape and Visual Impact Assessment

5.1 Introduction

The Landscape and Visual Impact Assessment (LVIA) evaluates the impacts of the Project on the landscape character and visual amenity during construction and operation phases, to the extent of which these affect perception and views of the landscape and visual resource of the Project site and the wider area.

Landscape character and visual amenity topics, although closely related, have been considered separately to ensure clarity and robustness of the assessment.

The proposal is for a 230 MWac Solar PV plant and associated infrastructure. The key components of the Project which may induce landscape and / or visual impacts are as follows (for further details please refer to Chapter 2 (Project Description)):

- Solar PV modules.
- Mounting structure or racks.
- Inverters for converting DC to alternating current (AC) electricity.
- Step-up Transformers.
- Temporary construction compound.
- Electrical substation.
- Access roads.
- Additional Project infrastructure such as scrap yard, storage area, drainage channels, etc.

The Project will connect to an OHL to be developed by Azerenergi. This line is proposed to service a number of projects and therefore has not been considered as an associated facility. It has however been included within the cumulative impacts assessment of this ESIA with further key features identified in Appendix B of this ESIA.

5.2 Assessment Scope and Methodology

The assessment describes the key components, features and characteristics that contribute to the quality and perception of the landscape within the Study Area. It provides an evaluation of the implications of the Project in terms of direct impacts on key landscape components and features. It considers the extent to which loss of features and the introduction of the Project would influence perception of local character within the Study Area and its implications for the wider landscape character.

Renewable energy development, including solar PV, inevitably attracts a spectrum of opinion from members of the public, ranging from very adverse to very beneficial reactions. However, using the precautionary principle, the LVIA has been carried out based on the assumption that all landscape and visual impacts reported are adverse.

The following potential issues have been assessed:

- The direct impact of the solar panels, associated structures and required access tracks on the baseline landscape of the site and its immediate environs.
- The indirect impact upon the landscape designations, character and visual amenity of the wider area arising from the introduction of potentially visible solar PV development into the area.

Key terms used in this baseline description and subsequent impact assessment are:

- Landscape Character Types (LCTs): Areas which are unique, discrete geographical areas of the landscape which demonstrate a series of recognisable and coherent features and characteristics.
- Visual Amenity: Relates to the way in which people visually experience the surrounding landscape. This includes the overall pleasantness of the views of their surroundings, which provides an attractive visual setting for the enjoyment of activities of the people living, working, recreating, visiting or travelling through the area.
- Representative viewpoints: Views selected to represent the experience of diverse types of visual receptor (such as local resident, recreational visitor, passer-by).

5.2.1 Study Area

An initial Study Area of 10 km from the site boundary was identified, consistently with the general approach of the ESIA. Following examination of mapping it was considered that any potentially significant visual impacts would be likely to occur within 5 km due to the limited nature of visibility beyond this area. As such, the Study Area for the purpose of the LVIA has been set up to 5 km from the Project site.

Figure 5-1: Location of the Study Area (5 km buffer)

5.2.1.1 Establishment of the Zone of Theoretical Visibility (ZTV)

In order to identify and assess potential impacts on the landscape and visual resource, a Zone of Theoretical Visibility (ZTV) has been established. A ZTV is a computer-generated tool used to identify the likely (or theoretical) extent of visibility of a development. The software uses a digital elevation dataset with the output from the analysis used to create maps of visibility. This was developed using ArcGIS software.

The ZTV defines the effective boundaries within which views of the Project could potentially be obtained. ZTVs have been prepared using specialist computer software which produces an analysis of a model using landform as the key determinant for assessing the view.

The contour data and Visibility Analysis maps (Section 5.4.2) used in the Visual Impact Assessment are based on Azerbaijan's Digital Terrain Model (DTM). It should be noted that the computer model does not consider features such as trees or woodland, buildings and other structures, which can vary the ZTV locally and therefore the Visibility Analysis within the ZTV cannot be fully representative of visual impact itself. Nevertheless, the ZTV is a valuable tool in assisting with the identification of areas of potential impact.

5.2.2 Assessment Guidance

The assessment has been prepared with reference to the Guidelines for Landscape and Visual Impact Assessment (Third Edition) (GLVIA) published by the Landscape Institute and the Institute of Environmental Management and Assessment of London, dated 2013.

5.2.3 Landscape Assessment

The GLVIA relies on an appreciation of the existing landscape, its sensitivity to change, a thorough understanding of the development proposals, the magnitude of change that would result from the construction and operation of the proposals and the potential to mitigate impacts. There are four key stages of the assessment:

- Establishment of the baseline.
- Appreciation of the Project.
- Consideration of variation of impacts over time.
- Assessment of Impacts.

5.2.3.1 Establishment of the Baseline

The following specific tasks have been undertaken and developed within Section 5.3:

1. A review of national and regional/local landscape designations.
2. A site appraisal of landscape character and its key landscape, ecological and cultural elements and identification of its Sensitivity to Change to development of the type proposed.

5.2.3.2 Variation of Impacts over Time

Landscape effects change over time as mitigation, such as planting and restoration of habitat types, included as part of the Project, evolves. The assessment acknowledges change and reports on the impacts during the construction phase and during the operation of the Project.

5.2.3.3 Landscape Impacts Assessment

The assessment of predicted impacts involves:

- A review of the sensitivity to change of designated sites and landscape character in relation to changes proposed, through a review of landscape value and scenic quality.
- An evaluation of the predicted magnitude of change experienced by designated sites and landscape character types, resulting from the construction and operation of the Project.
- Assessment of the degree and significance of the potential effect of the Project on the identified landscape designations and character during the construction and operational phases.

Sensitivity to Change

Sensitivity to change considers the nature of the landscape and its ability to accommodate development of the type proposed without compromising its key characteristics and components. Sensitivity to change is defined through appraisal of scenic quality, value, and the capacity of the landscape to accommodate change.

The scenic quality is defined based on more or less stimulating and distinctive landscape components composition, aesthetically and scenically outstanding or conflicting with surroundings, considering also presence of any degraded or obtrusive areas or features.

Landscape value is another determinant of sensitivity and is frequently addressed by reference to international, national, regional and local designations, determined by local and national Planning Authorities. However, absence of such a designation does not necessarily imply a lack of quality or value. Factors such as accessibility and local scarcity can render areas of nationally unremarkable quality, a highly valuable local resource.

Hence, according to the criteria conferred to scenic quality and the landscape value explained previously, the Sensitivity to change of the type proposed has been evaluated with reference to the subject areas above and using a three-point scale as follows:

- **High** – A landscape of particularly distinctive character susceptible to relatively small changes of the type proposed;
- **Medium** – A reasonably valued landscape with a composition and characteristics tolerant of some degree of change of the type proposed; and
- **Low** – A relatively unimportant landscape which is potentially tolerant of a large degree of change of the type proposed.

Magnitude of change

Magnitude of change concerns the degree to which the Project would alter the existing characteristics of the landscape. The determination of magnitude of change has considered the potential for both direct and indirect change. Direct change occurs where the Project would result in a physical change to the landscape, whilst indirect change may occur where the Project would become a feature in the landscape but would be physically located in an adjacent landscape area. The ZTV is used as a tool to gauge the extent of potential indirect change, supported by targeted field surveys.

Magnitude of change has been assessed on a four-point scale of high, medium, low or negligible. These criteria are described as follows:

- **High** – Noticeable change in the landscape characteristics over an extensive area ranging to a very intensive change over a more limited area.
- **Medium** – Perceptible change in landscape characteristics over an extensive area to noticeable change in a localised area.
- **Low** – Virtually imperceptible change in landscape characteristics over an extensive area or perceptible change in a localised area.
- **Negligible** – No discernible change in any landscape characteristics or components.

Intervisibility as a medium of indirect change to landscape character has been considered in determining the magnitude of change. The potential extent of this visibility is assessed from the ZTV, or visual envelope. The prominence of the solar plant in the landscape would vary according to the weather conditions.

Impact Significance

Evaluation of the predicted level of impact has been carried out through analysis of the magnitude of change anticipated to be experienced by a designated site or landscape character type/area in relation to the identified sensitivity to change of the type proposed and using a degree of professional judgement. The assessment considers direct impacts upon existing landscape elements, features and key characteristics and assesses whether these would be lost, or their relationships modified, in the context of their importance in determining the existing sensitivity of the character type/area in question. It also considers indirect impacts on the wider landscape context.

Anticipated impacts are reported in terms of a descriptive scale ranging from substantial – moderate – slight adverse – through negligible and no change to an ascending scale of slight – moderate – substantial beneficial.

The criteria adopted for the assessment of landscape impacts are as follows:

- **Substantial adverse (or beneficial)** – very noticeable deterioration / improvement in the existing landscape.
- **Moderate adverse (or beneficial)** – noticeable deterioration / improvement in the existing landscape.
- **Slight adverse (or beneficial)** – perceptible deterioration / improvement in the existing landscape.
- **Negligible** – virtually imperceptible deterioration / improvement in the existing landscape.
- **No Change** – no deterioration / improvement in the existing landscape.

For the purposes of this assessment, impacts of moderate and above are considered to be significant in terms of ESIA.

5.2.4 Visual Amenity Assessment

Adverse visual impacts may occur through the intrusion into established views of new features, out of keeping with the existing structure, scale and composition of the view. However, visual impacts may also be beneficial where an attractive focus is created in a previously unremarkable view or the influence of previously detracting features is reduced. The significance of impacts will vary, depending on the nature and degree of change experienced and the perceived value and composition of the existing view.

In the context of the Project, key concerns relate to:

- The introduction of solar PV panels and associated structures tracks and compounds areas to established views.
- The introduction of solar PV panels and associated features into views from roads and other routes experienced by those passing through the area.
- The potential for solar PV panels and associated features to alter recognised or valued views experienced by communities, tourists, and visitors, including hill tops.

A full description of the elements is provided in Chapter 2 (Project Description).

GLVIA suggests that visual impacts are assessed from a clear understanding of the development proposed and any mitigation measures which are being adopted. Familiarity with the site and the extent, nature and expectation of existing views is also a key factor in establishing the visual sensitivity to change in terms of the development proposed. The guidelines require evaluation of magnitude of change to views experienced by sensitive receptors comprising individuals living, working, travelling and carrying out activities within the landscape, subsequent evaluation of impact significance.

5.2.4.1 Viewpoints and Visual Receptors

The visual impact is subject to the presence of a viewer. Views experienced from locations such as buildings (i.e., farms), recognised routes and touristic spots used by the public have been included in this assessment. Potential receptors have been identified through analysis of the ZTV in combination with targeted field survey. Visual receptors have been identified within the 5 km buffer as coincident with identified viewpoints, being representative of the various types of receptors at the proposed site.

5.2.4.2 Variation of Impacts over Time

Visual impacts change over time as mitigation, such as planting and restoration of habitat types, included as part of the Project, establish and mature, and as the existing landscape external to the development evolves. The assessment acknowledges change and reports on the impacts during the construction phase, and during the operation of the Project.

5.2.4.3 Visual Amenity Impacts Assessment

The aim of the visual assessment is to identify, predict and evaluate the significance of potential impacts to established views arising from the Project. This has involved the following specific assessment tasks:

- An appreciation of the nature, form and features of the Project in the context of the baseline landscape character (refer to Section 0).
- An evaluation of the predicted magnitude of change likely to take place to existing views from identified receptors as a result of the construction and operation of the Project.
- An evaluation of the degree and significance of the potential impact of the Project on views from identified receptors during the construction and operational phases.

Sensitivity to Change

Sensitivity to change considers the nature of the receptor and the viewing expectation of those using the receptor. The importance of the aspect of the view which would be changed contributes to the sensitivity evaluation.

Sensitivity to change proposed has been evaluated with reference to the subject areas above and using a three-point scale as follows:

- **High -** dwellings, footpaths, tracks and vantage points where the changes form part of an important view.
- **Medium -** dwellings, footpaths, tracks and vantage points where the changes form part of a less important view, and roads where the changes form part of an important view.

- **Low -** dwellings, footpaths, tracks and vantage points where the changes form part of an unimportant view, roads where the changes form a part of a less important view, and farm buildings (not used as dwellings) and industrial buildings where the changes form part of an important view.

Magnitude of change

Magnitude of change concerns the extent to which the existing view would be altered by the Project. Magnitude of change has been evaluated using a four-point scale comprised of the following criteria:

- **High** – Where the Project would result in a very noticeable change in the existing view.
- **Medium** – Where the Project would result in a noticeable change in the existing view.
- **Low** – Where the Project would result in a perceptible change in the existing view.
- **Negligible** – Where the Project would result in a barely perceptible change in the existing view.

Impact Significance

The level of impact identified concerns the importance of changes resulting from the Project. Evaluation of the impact is based on consideration of the magnitude of change in relation to sensitivity and is established using professional judgement. The assessment considers likely changes to the visual composition, including the extent to which new features would distract or screen existing elements in the view or disrupt the scale, structure, or focus of the existing view.

The prominence of the solar PV panels in the view will vary according to the prevailing weather conditions. Level of Impact has been evaluated using a five-point scale and using the following criteria:

- **Substantial** – The Project would become a prominent and very detracting feature and would result in a very noticeable deterioration to an existing highly valued and well composed view.
- **Moderate** – The Project would introduce some detracting features to an existing highly valued and well composed view or would be prominent within a pleasing or less well composed view, resulting in a noticeable deterioration of the view.

- **Slight** – The Project would form a perceptible but not detracting feature within a pleasing or valued view or would be a more prominent feature within a poorly composed view of limited value, resulting in a small deterioration to the existing view.
- **Negligible** – The Project would form a barely perceptible feature within the existing view and would not result in any discernible deterioration to the view.
- **No Change** – The Project would not feature in any existing views and would result in no change to the view.

For the purposes of this assessment impacts of moderate adverse and above are significant in terms of ESIA.

5.2.5 Impacts scoped out of assessment

Impacts arising from the process of decommissioning have been scoped out since they are of a similar nature to construction issues, but of a smaller scale and shorter duration. Where the assessment refers to potential construction impacts these are also considered representative of predicted decommissioning effects. Following decommissioning, it assumed the Project site will be re-instated to its original condition.

5.2.6 Cumulative assessment

A cumulative impact assessment for the proposed development is presented in Chapter 13.

5.3 Landscape Assessment

The landscape impacts have been evaluated through overlapping and embedding the PV system layout within photographs taken at the Project site, reflecting the current state of the Project area. This photographic simulation, showing the Project area before and after the design implementation, were realized referring to three landscape Points of View (POV 1 to 3) located close to the Project area boundaries (Figure 5-2). It should be noted that, as the area is extremely wide, the photos taken at “human height” display only some portions of it. For this reason, a "bird’s-eye view" was created to have an overview of the area itself.

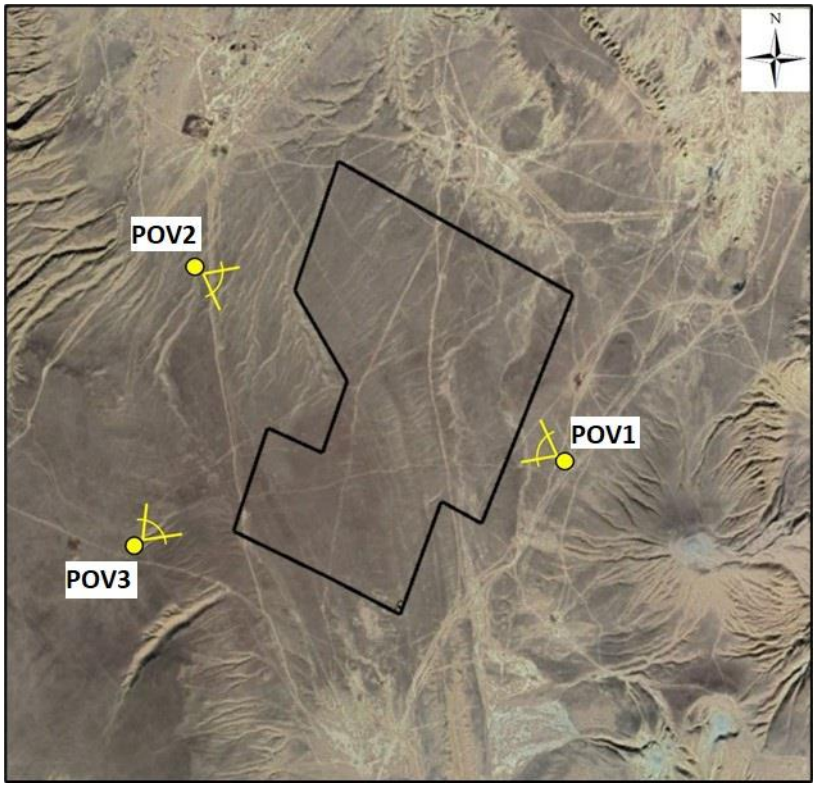


Figure 5-2: Location of the Points of View (marked POV)

All LCTs within a 5 km buffer have been identified. Those that are expected to receive potential inter-visibility with the Project have been considered as part of this assessment.

5.3.1 Landscape Baseline

The Project will cover approximately 550 ha of primarily semi-desertic land, within an existing rural landscape. The Project site and its surroundings are used by nomadic tribes and local residents for informal grazing of cattle and small cattle and as a winter pasture. A number of livestock farms connected by an informal network of smaller tracks were identified during the site visits.

The Project site is within the South West Gobustan Contract Area, an onshore oil field in Azerbaijan. SOCAR contractors installed the "Babek-Umid" underground gas pipeline owned by the GOC, running approx. 1.0-3.0 km East to the Project site, from the Dashgil gas field to the Sangachal terminal, with a diameter of 1000 mm. Abandoned and operating wells owned by GOC are also present in the vicinity of the Project area. Thus, the landscape value of the study area has already been disturbed by other on-going developments.

5.3.1.1 Landscape Character Types

Rural Areas and Farmlands

The landscape comprises plots of farmland and scattered buildings, defining the overall character of this landscape type. Farm buildings consist of one or more one-story primitive dwellings, buildings for storing tools and hay, summer pens and winter cattle barns, built in rows from local building material (brick) or other materials at hand.

Livestock breeding for nomadic tribes of this territory and residents of neighbouring districts is a traditional perennial type of rural activity in the Study Area. Pastures are generally located in hilly plains at a distance of about 3-5 km from farms and from each other. The ecosystem of the study area can be generally described as anthropogenically disturbed, comprising areas of farmland (livestock grazing mostly) and scrubs (desert and steppe flora).

This LCT is considered as reasonably valued landscape with importance in a local context, although not nationally designated. As such, considering a low landscape value of medium scenic quality (LCT has been disturbed by human influences), the sensitivity is considered medium.

Designated Areas

Considering the extension of the Study Area (Figure 5-1), the only cultural heritage site protected by the State is the Gobustan State Historical and Artistic Reserve. The Gobustan National Park, officially "Gobustan Rock Art Cultural Landscape" World Heritage Site (WHS), is a hill and mountain site occupying the south-east end of the Greater Caucasus mountain ridge. The site has outstanding universal value for the quality and density of its rock art engravings, for the substantial evidence the collection of rock art images presents for hunting, fauna, flora, and lifestyles in pre-historic times and for the cultural continuity between prehistoric and medieval times that the site reflects.

The cultural and archaeological evidence are localized in three confined WHSs, while a buffer zone is set around them for maintaining the outstanding universal value, including conditions of integrity and authenticity of the property. The WH Site closest to the Project area is located 3 km far in east direction and the distance between the Project area and the WH Buffer Zone results to be around 1.8 km (Figure 5-3). In addition, the "Gobustan Reserve" Important Bird and Biodiversity Area (IBA) and Key Biodiversity Area (KBA) has been identified as the closest to the Project site. This area is a State Nature Reserve which meets the IBA criteria B3 "Regionally important congregations" and is identified as including species of global conservation concern.

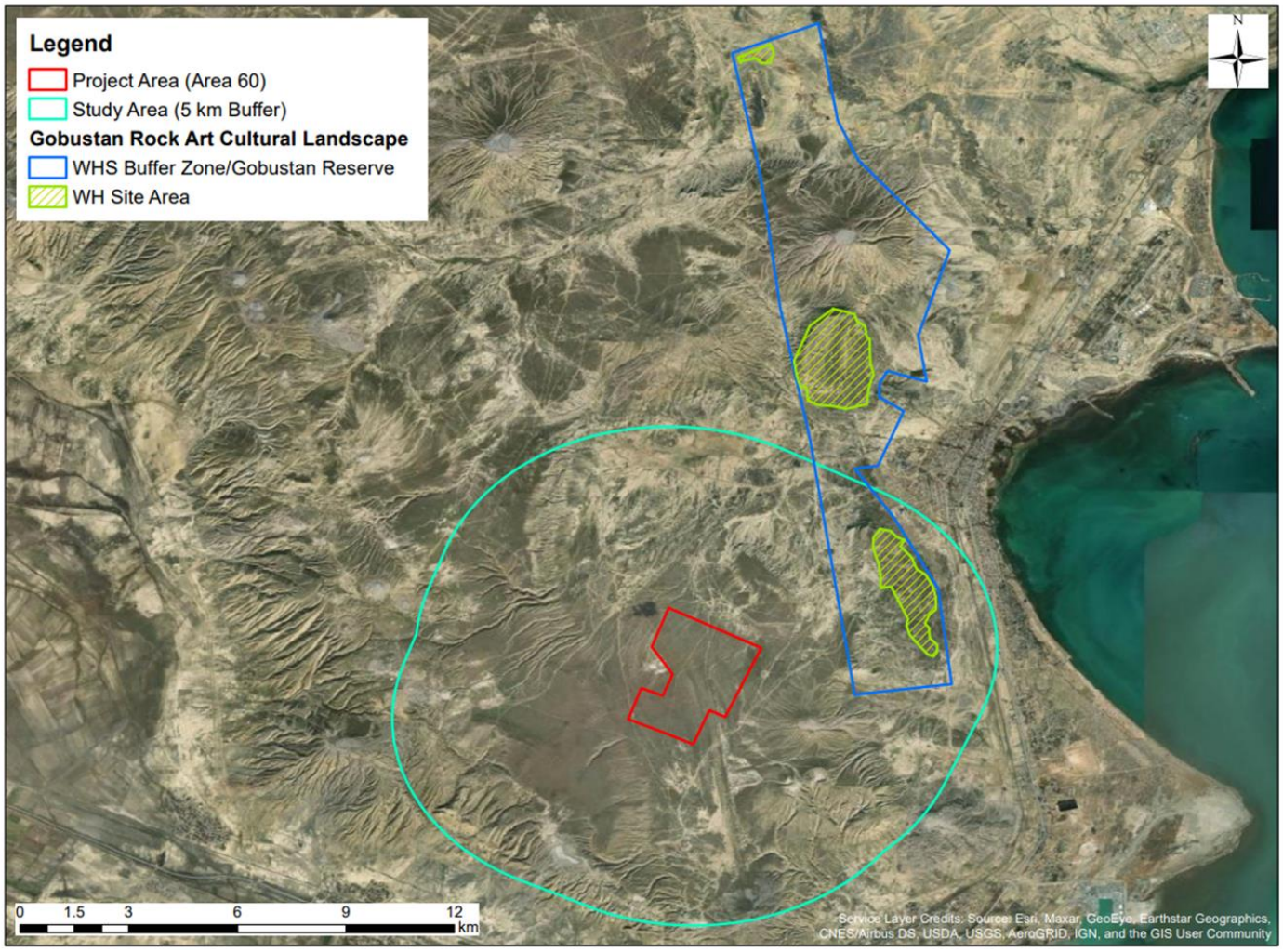


Figure 5-3: Location of the WH Sites & Buffer Zone within Gobustan Rock Art Cultural Landscape

This LCT is considered particularly distinctive character landscape as nationally designated and due to the income generated from tourism. As such, considering a high landscape value of high scenic quality, the sensitivity is considered high.

Mud Volcanos touristic area

The eastern territory of Azerbaijan is also characterized by the widest distribution, as well as by the presence of all existing types of mud volcanoes. Alike the other parts of the Langabiz-Alat subzone and the rest of Shamakh-Gobustan zone, surroundings of the Project area are characterized by high mud volcanic activity.

As shown in Figure 5-4, there are four volcanos detected in the closest vicinities of the Project area, including three situated to the east (*Goyarchin, Dilangaz* and *Dashgil* – the last is officially Gobustan Mud Volcano), and one volcano located to the south (*Goturdagh*). Goturdagh and Dashgil are of a touristic interest too whilst the other two volcanos are sensitive environmental elements.

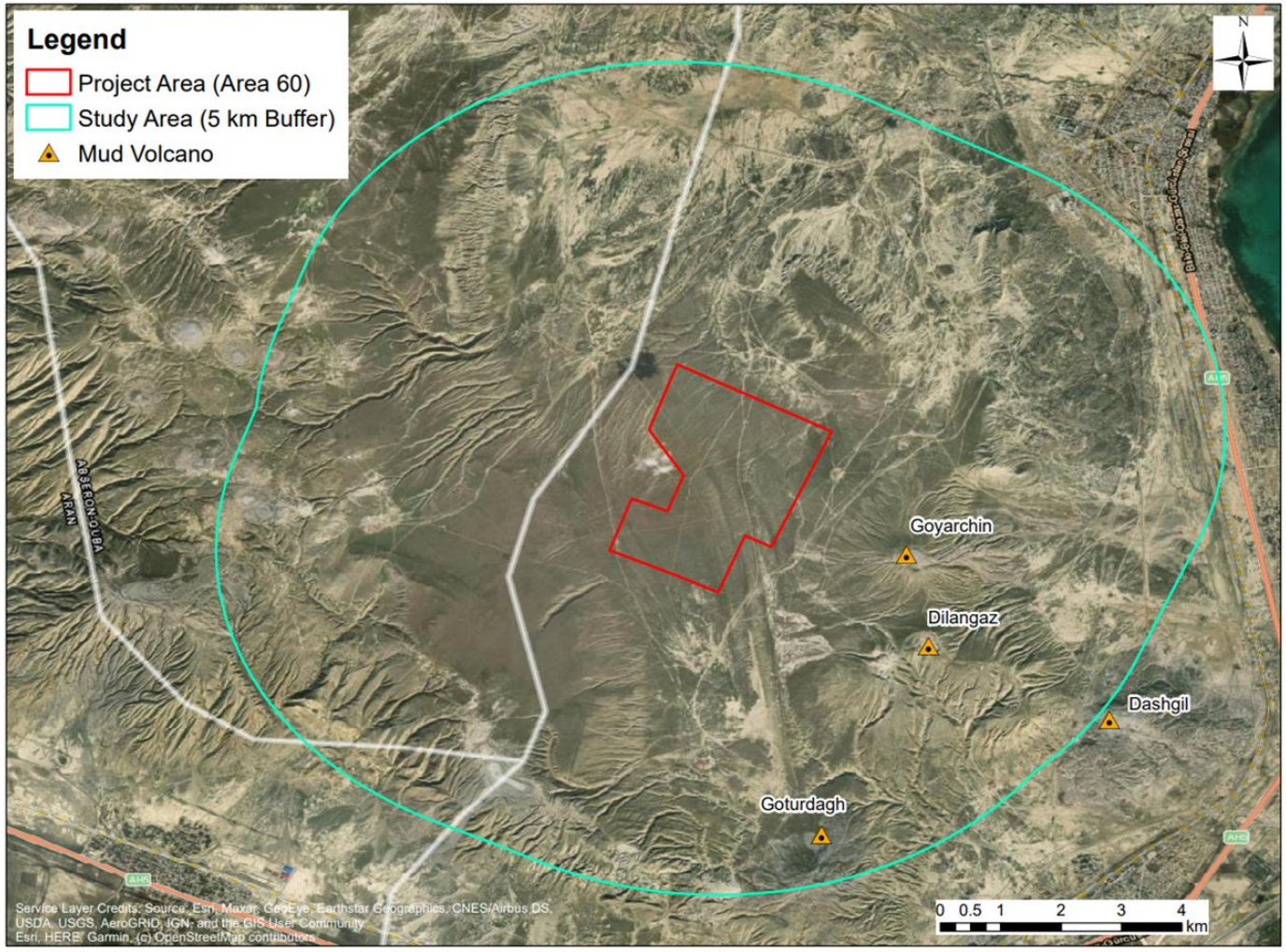


Figure 5-4: Location of the Mud Volcanoes with respect to the Project area

This LCT is considered particularly distinctive character landscape even if not nationally designated due to the income generated from tourism. As such, considering a medium landscape value of high scenic quality, the sensitivity is considered medium to high.

5.3.1.2 OHL landscape baseline

The OHL is located in a river valley landscape formed by the waterway of Kur, enriching the far eastern segment of the OHL route (illustrated within Figure 13-3). Finally, the other landscape types of the area are the anthropogenic (urban) landscape of Shirvan, and the natural landscapes modified due to a human activity (the latter landscape type is developed mainly on the plain part of the study area).

The most valuable landscape type in terms of visual perception, are the mountain-steppe landscapes formed due to mud volcanic activity. River valley landscape of Kur and cultural landscape of Shirvan are the 2nd and 3rd valuable landscape types that are limitedly spread in the far south-eastern part of the area. Finally, modified natural landscapes do not bear any visual value, as they are spread rather fragmentarily against the richer background of mud volcanoes.

When moving from Hajigabul region to Shirvan city along the OHL route, the relief forms plains, arable lands, low hills, areas covered with willow bushes, mountains and broken ravines.

5.3.2 Assessment of Potential Landscape Impacts

5.3.2.1 Construction Phase

The Project is expected to induce the following: the first change is to the land, through topsoil stripping and earth-moving, and the second is the introduction of machinery and equipment for construction purposes, temporary works, construction compounds, access road and on-site roads. New machinery and equipment will be introduced into the landscape, including heavy goods vehicles excavators, bulldozers, and other heavy equipment.

The magnitude of change to the LCTs during construction is **Low**, as only a proportion of the local landscape will be affected by topsoil stripping and bare ground. The impact period during construction is temporary and medium-term as it will takes approximately 10 months. The significance of impact during construction is **Slight** and not significant.

Landscape impacts are thus not considered to be a significant adverse impact during construction, considering also that the Project will apply "industry standard "good house-keeping" measures routinely adopted during the construction phase.

5.3.2.2 Operational Phase

Photographic simulations

In order to assess the compatibility of the introduction of the Project in the surrounding environment, photographic simulations of the area were created representing the conditions before and after the construction of the photovoltaic system as shown in the following figures (from Figure 5-5 to Figure 5-8).

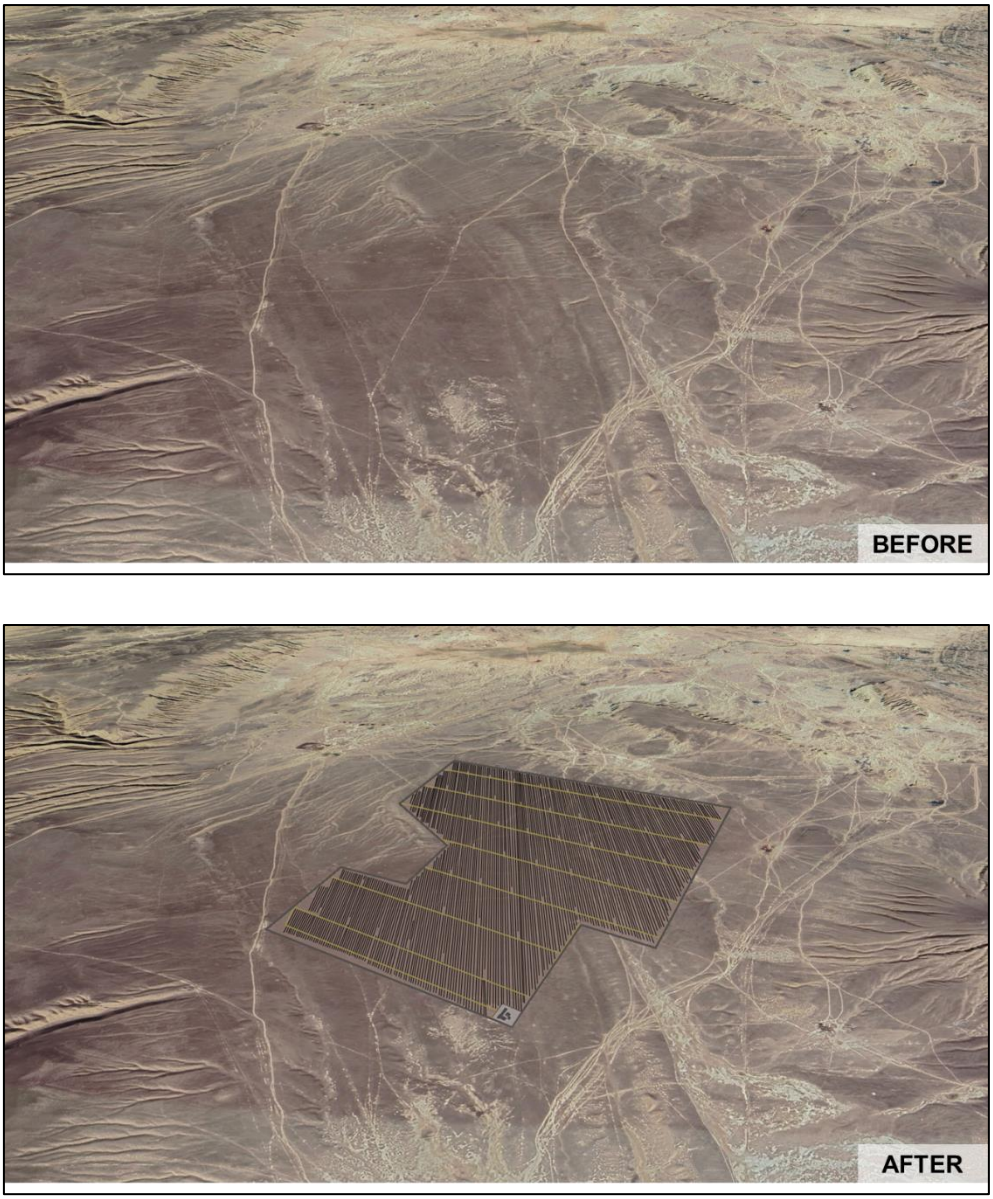


Figure 5-5: Bird's eye view of the Project area before and after the implementation of PV plant

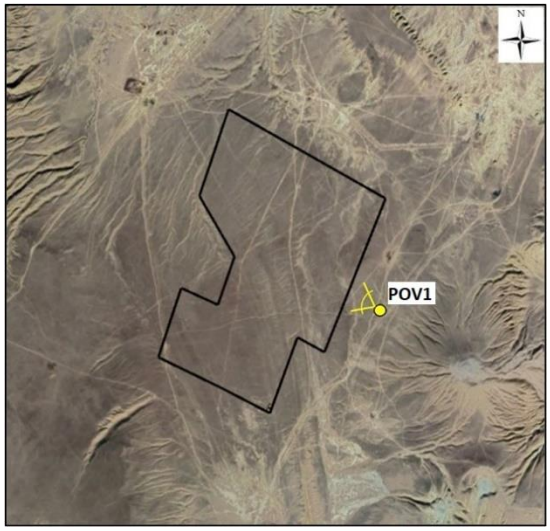
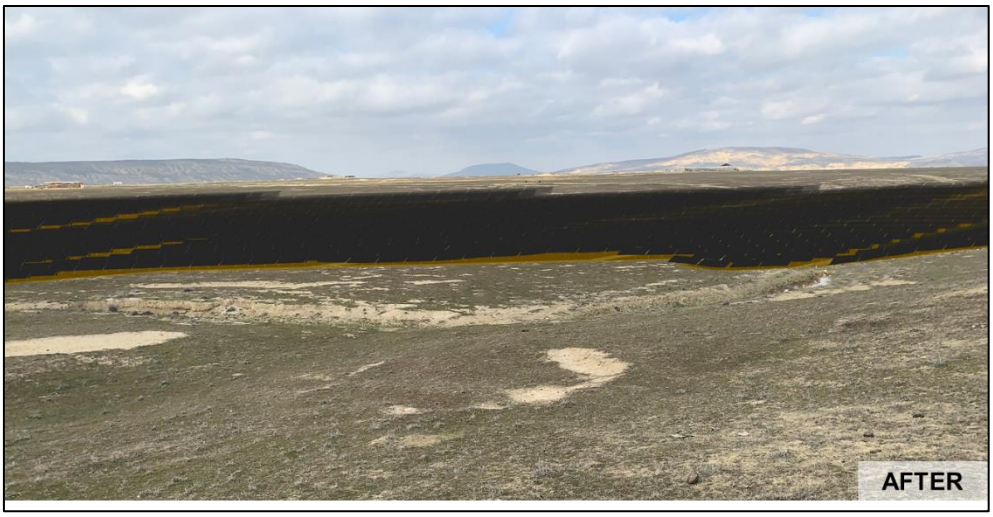


Figure 5-6: Eastern Point of View of the Project area before and after the implementation of PV plant



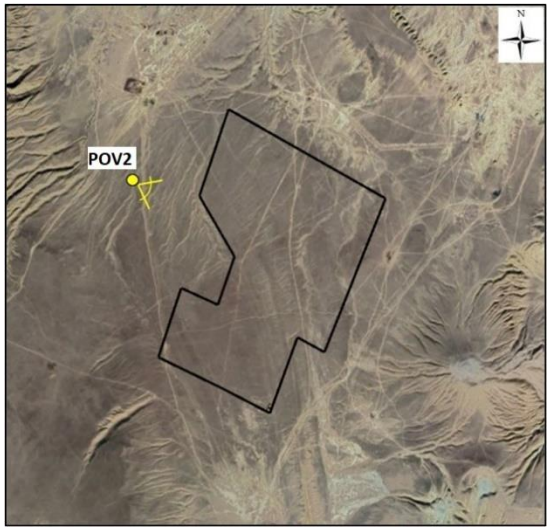


Figure 5-7: Western Point of View of the Project area before and after the implementation of PV plant

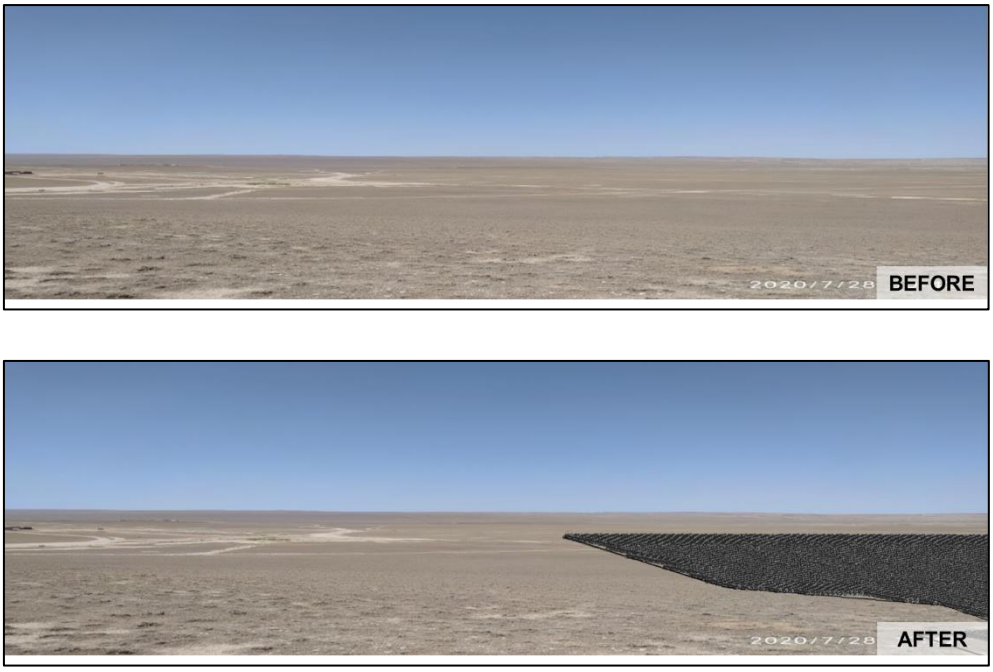


Figure 5-8: South-Western Point of View of the Project area before and after the implementation of the PV plant

Impacts on Landscape Character Types

The main source of impact to the identified LCTs during operation is the introduction of the solar PV panels, associated structures, inverters, and substation. Other elements of operation of the Project that will affect the landscape comprise on-site roads, including access roads, and occasional vehicles that pass along the roads. The Project has the potential to change the visual quality of the area resulting from development or change in land use that will alter the landscape. The presence of facilities may impact visual character and sense of place into the existing rural landscape, particularly when viewed from areas of cultural importance (i.e., Gobustan Rock Art Cultural Landscape).

The sensitivity of the Designated Areas and Mud Volcanoes touristic area LCTs is assessed to be **High** as well as the magnitude of the impact due to the semi-desertic landscape with no screening elements of the site from key receptors at the local scale. On a larger scale, the screening is slightly given by the topography of the surrounding area characterized, in the northern and north-western parts of the Project area, by low plateau-like ridges with a steep slope to the north-west and hilly uplands heavily indented by ravines. As a result, the impact is assessed to be **Moderate**.

The sensitivity of Farmlands/Rural Areas LCT has been considered as **Medium.** During operation, the greatest impacts would be experienced particularly at distances of less than 1 km from the proposed site. However, the LCT provides adequate capacity to absorb this level of impact without materially affecting the key characteristics of the LCT. Therefore, the magnitude of impact is likely to be **Medium** at distances of up to 1 km reducing to **Low** at further distances. As a result, the significance of the impact is **Slight** and not significant.

5.4 Visual Amenity Assessment

The following section provides an assessment of potential impacts on the visual amenity of the area resulting from the introduction of the Project. It describes and evaluates the potential change in existing views obtained from routes, popular destinations and strategic viewpoints during the construction and operational phases of the Project, and the extent to which these affect visitors and users of the landscape.

The visual impact of the Project area was assessed through ZTV discussed in Paragraph 5.2.1.1. Six viewpoints within 5 km of the Project were selected, as it is within this area that significant visual impacts are most likely to occur.

5.4.1 Viewpoints and Receptors

5.4.1.1 Farms and Cemeteries Receptors

Several small farms were identified during the site visit and are the only activities identified at relatively close proximity of the Project area. In particular, twelve sheep and cattle farms were detected to be present in the vicinity of the Project area (Figure 5-9). As shown in Figure 5-9, Farm "ID-1" is located around 300 m East from the Project area, Farm "ID-9" is located around 600 m North from the Project area, while all the other identified farms are far more than 900 m from the site.

It is worth also mentioning the presence of two cemeteries (Gara Atli cemetery and

Khanali cemetery) in the vicinity of the Project area (Figure 5-10).

- A recent fenced-in Muslim cemetery, where the funeral practices still occur, located at the distance of about 1.2 km from the north-western boundary of the Project area.
- A more ancient cemetery, still used for funeral practices, located around 0.35 km from the southern boundary of the Project area.

The identified cemeteries are not elements of cultural heritage protected by the State but are sacred places considered holy by the locals.

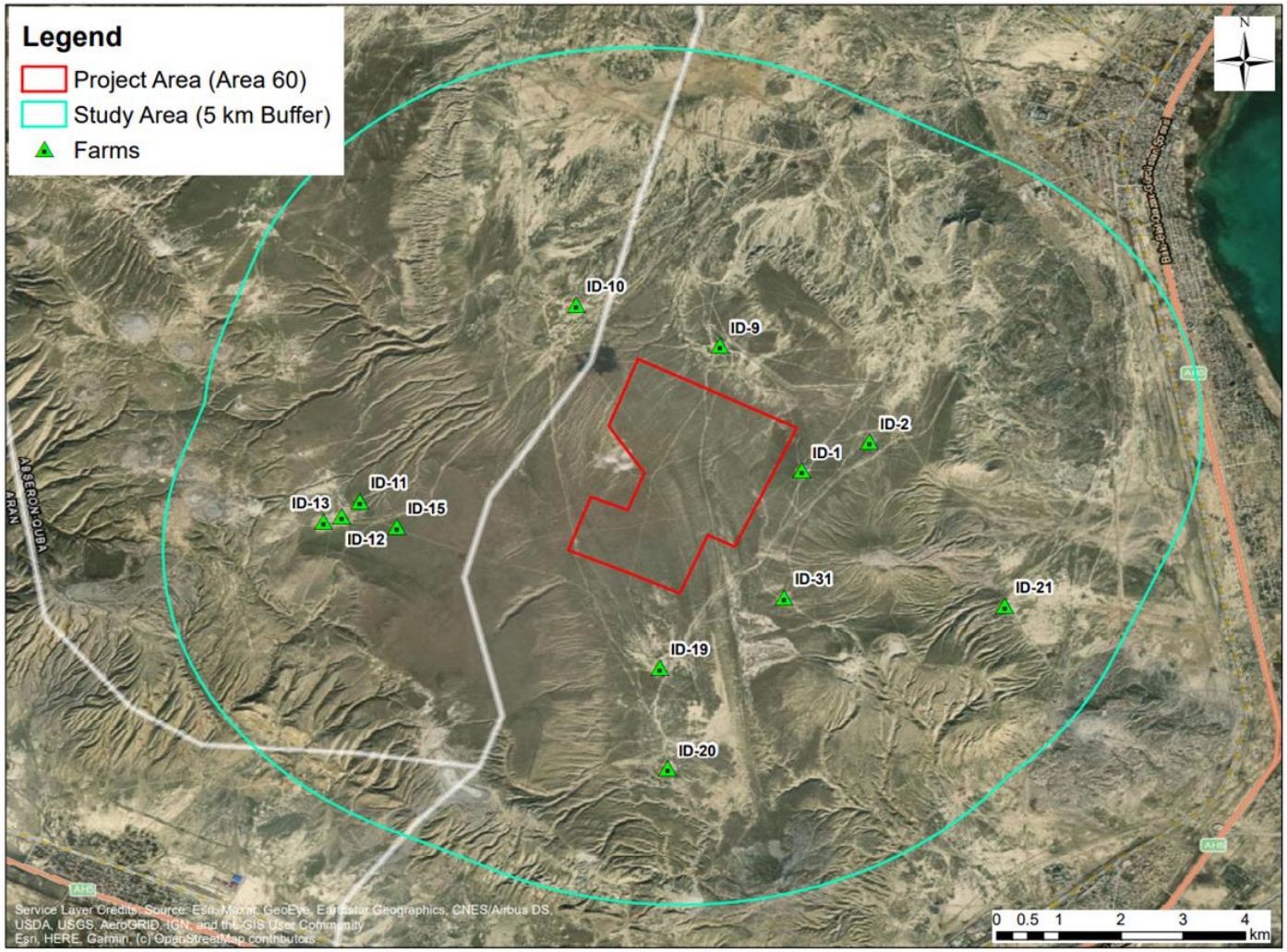


Figure 5-9: Location of farms in the vicinity of the Project Area

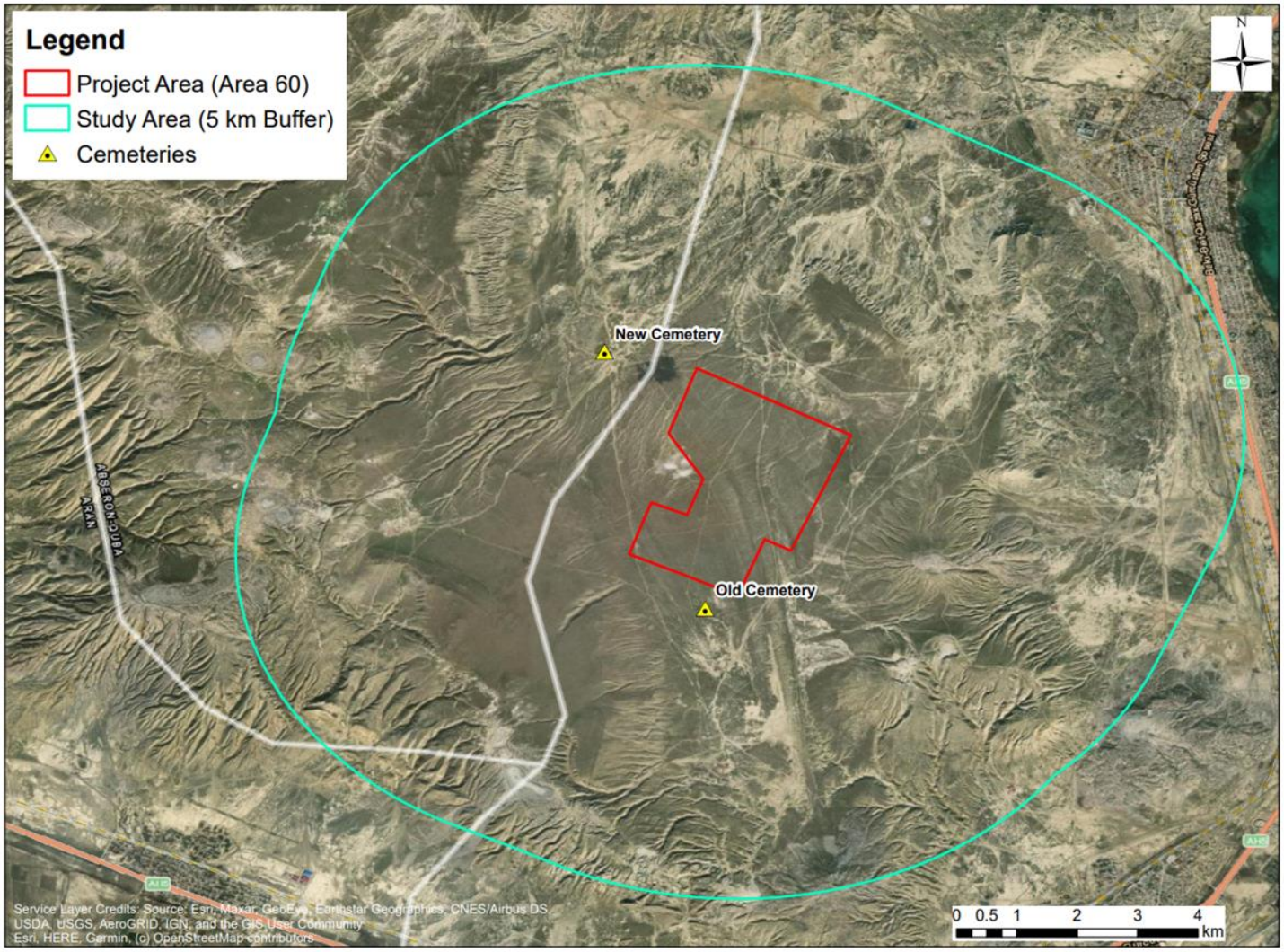


Figure 5-10: Location of cemeteries detected in the vicinity of the Project Area

5.4.1.2 Viewpoints

The ZTV has informed the selection of six viewpoints (VP) detailed in Table 5-1 and shown on Figure 5-11 below. These viewpoints are intended to provide a representative cross section of potential visibility and impact of the Project throughout the Study Area.

Table 5-1: Representative Viewpoints

Ref	Location	Grid Reference (UTM WGS84)		Reason for Inclusion
VP1	Muslim Cemetery	40.0475	49.3246	Representative settlement and graveyard.
VP2	Farm "ID-1"	40.0275	49.3614	Representative settlement (farm closest to the Project Area among the twelve identified).
VP3	Goturdagh mud volcano	39.9793	49.3596	Representative sensitive environmental element and tourist attraction.
VP4	Qobustan road	40.0555	49.3657	Representative of transient views from the access road to the site.
VP5	Gobustan Rock Art Cultural Landscape	40.0653	49.3873	Representative of WH site and tourist attraction.
VP6	Farm "ID-12"	49.2953	40.0265	Representative settlement.

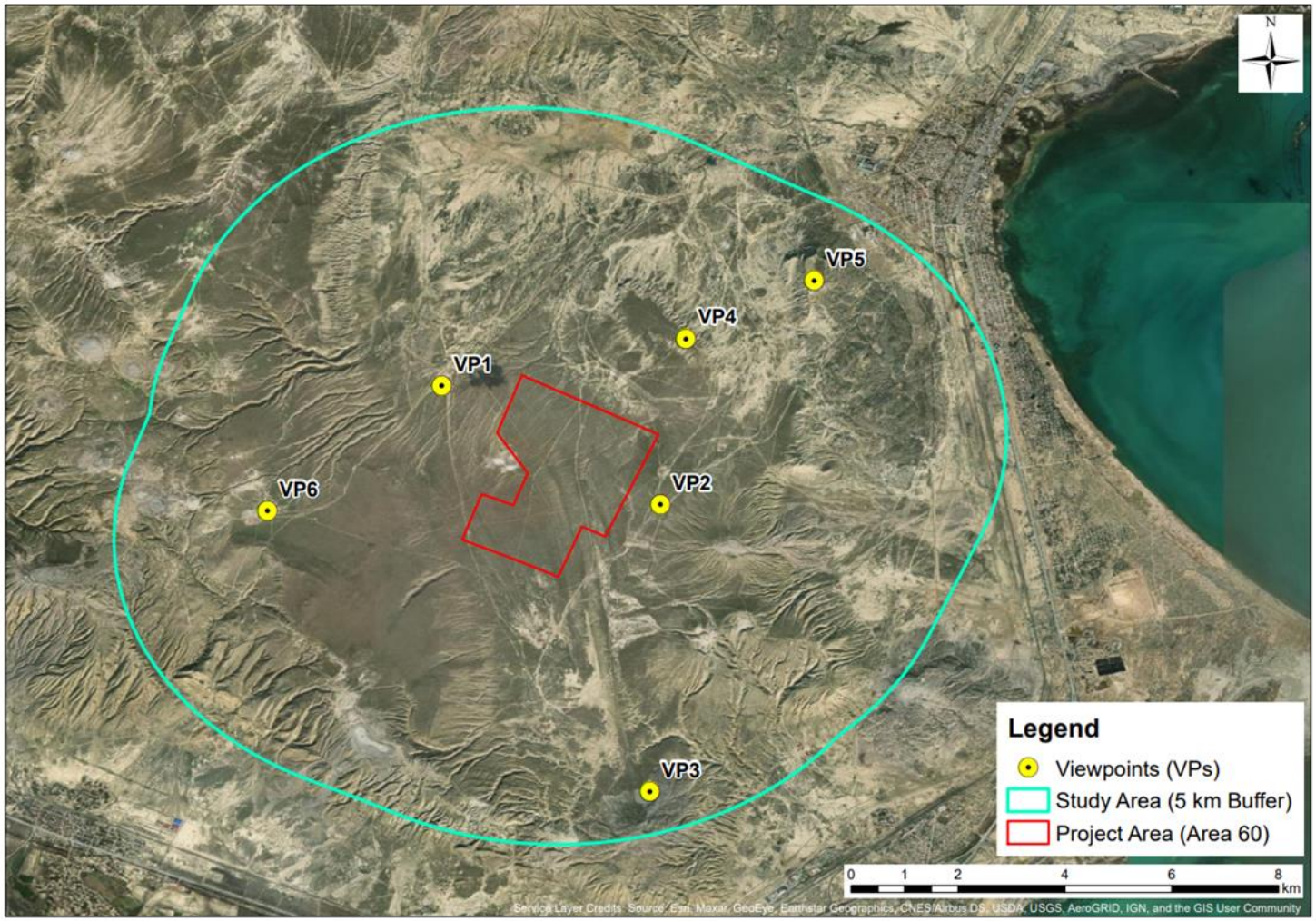


Figure 5-11: Location of the viewpoints and receptors selected

5.4.2 Assessment of Potential Visual Impacts

5.4.2.1 Construction and Operational Phase

The following figures (from Figure 5-12 to Figure 5-17) show the ZTV for the Project. An observer of medium height equal to 1.7 m, placed on the ground level, was considered for the ZTV.

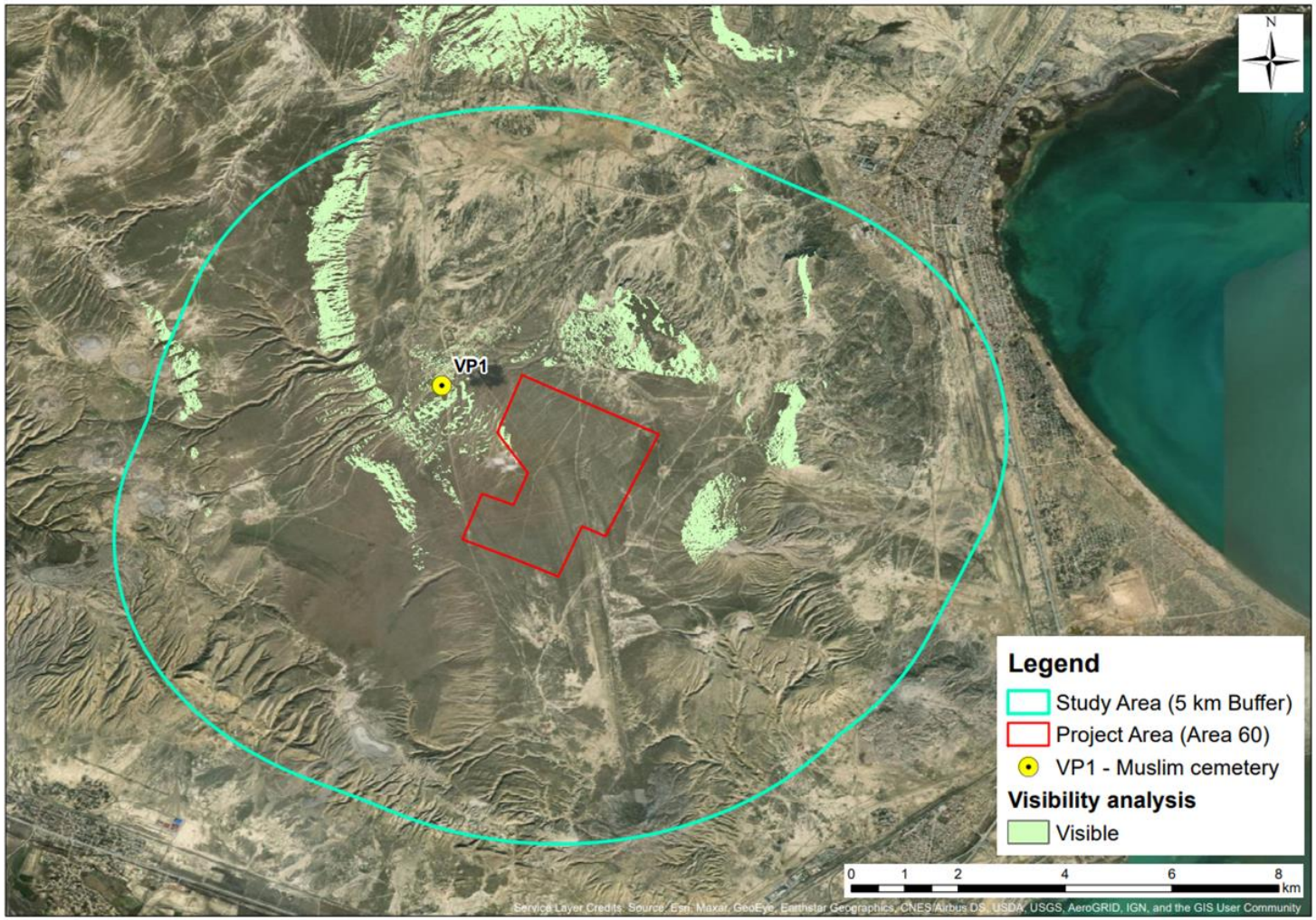


Figure 5-12: VP 1 – Muslim cemetery; Observer height 1.7 m a.g.l.

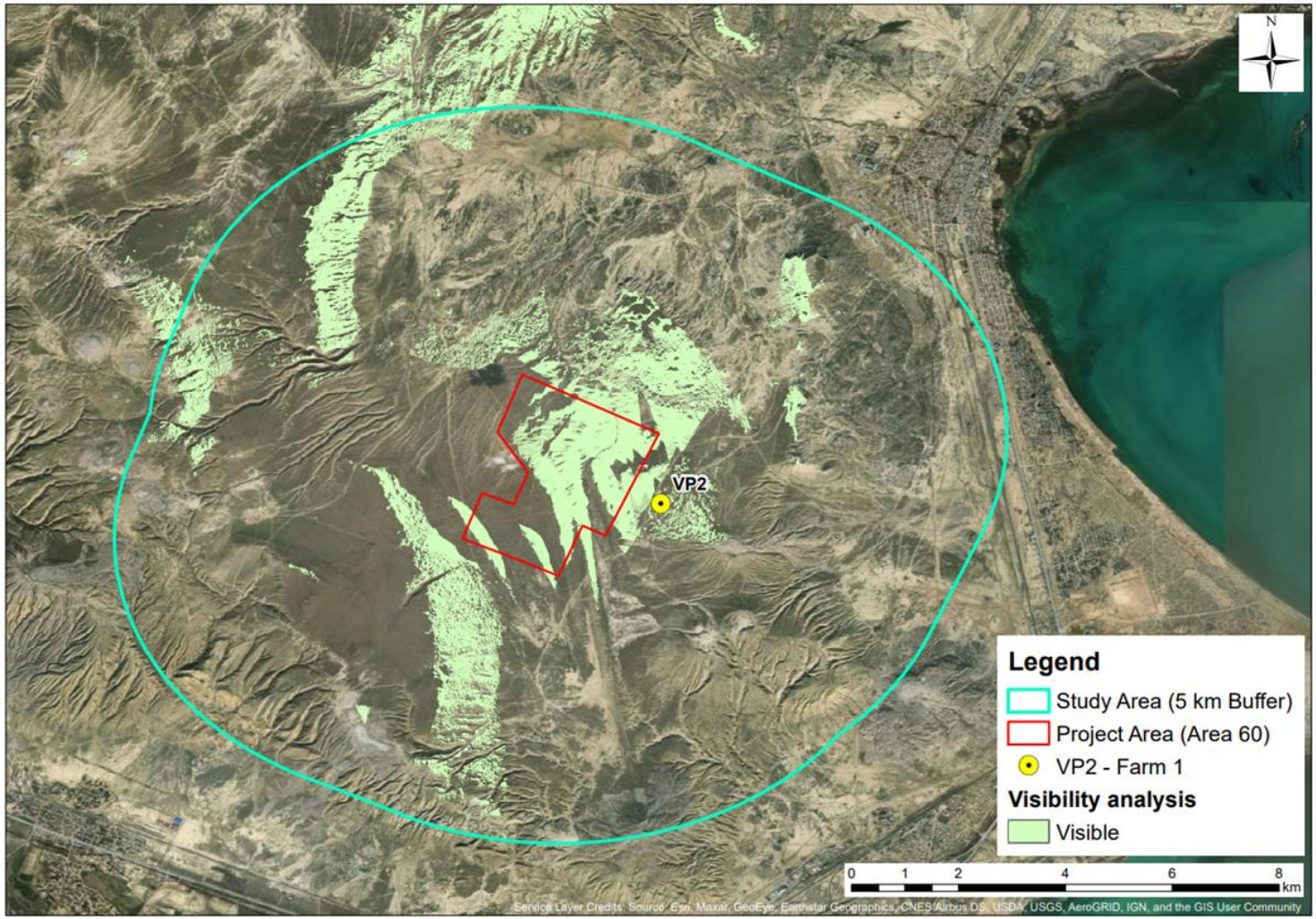


Figure 5-13: VP2 – Farm "ID-1"; Observer height 1.7 m a.g.l.

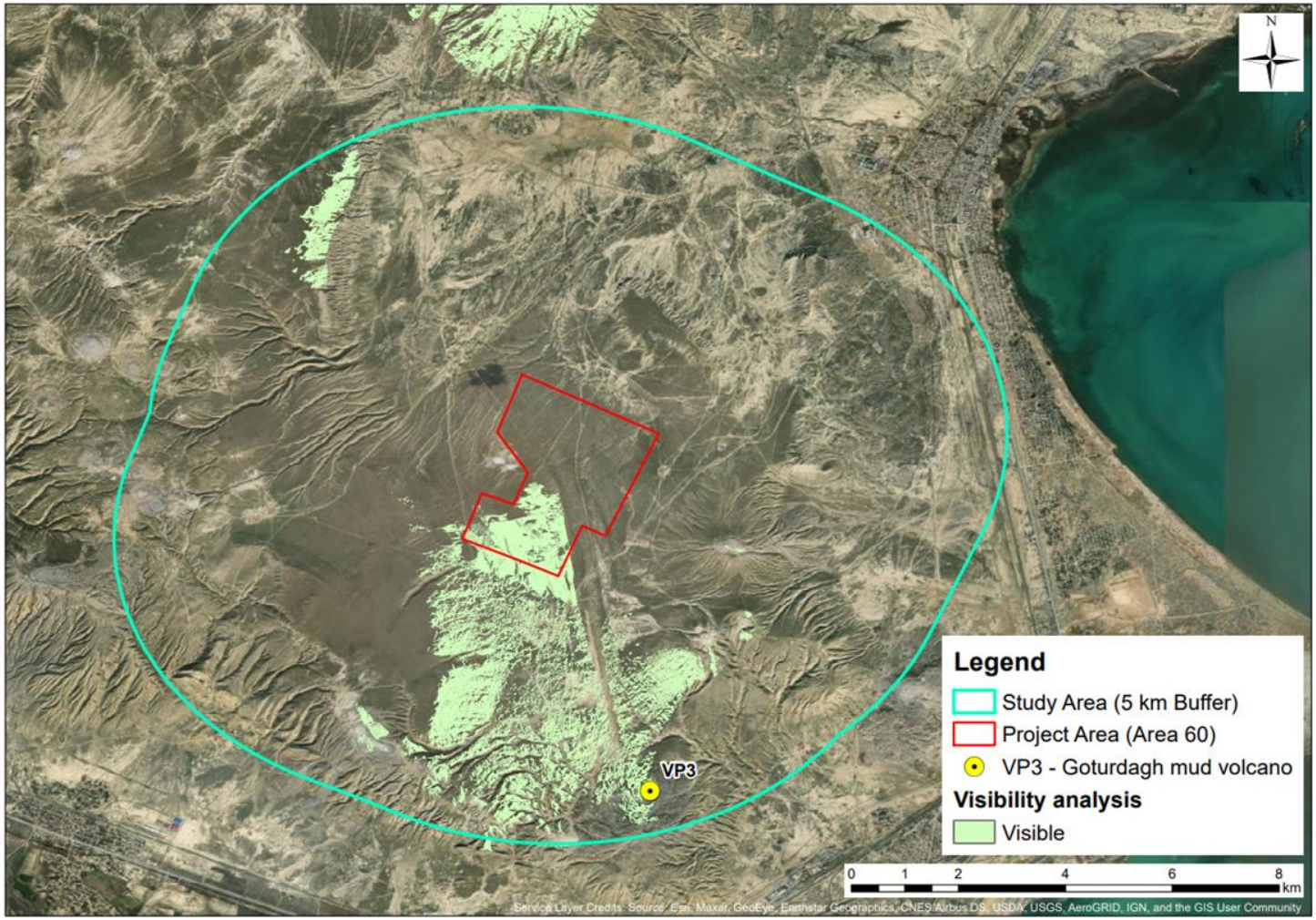


Figure 5-14: VP3 – Goturdagh mud volcano; Observer height 1.7 m a.g.l.

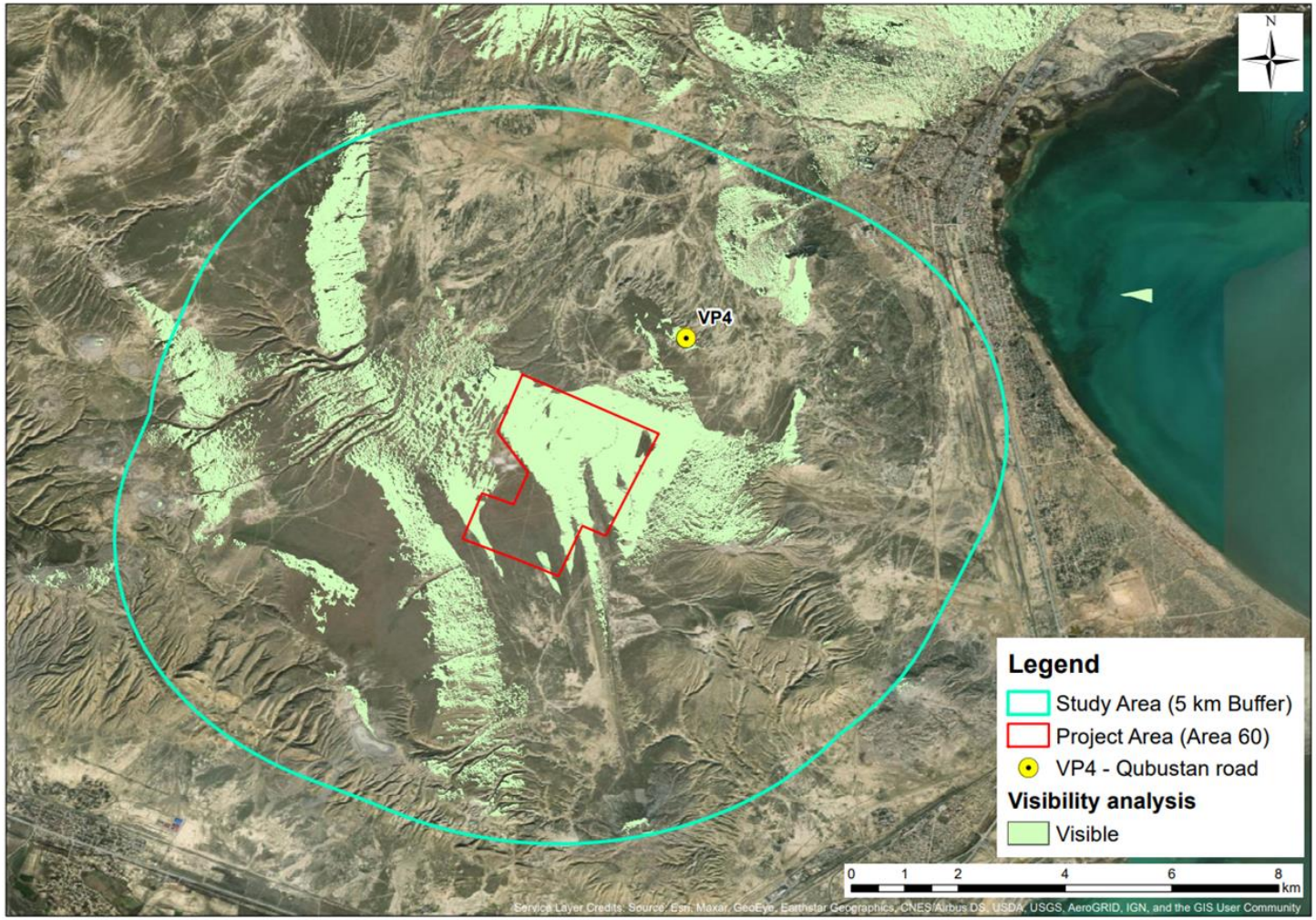


Figure 5-15: VP4 – Qobustan road; Observer height 1.7 m a.g.l.

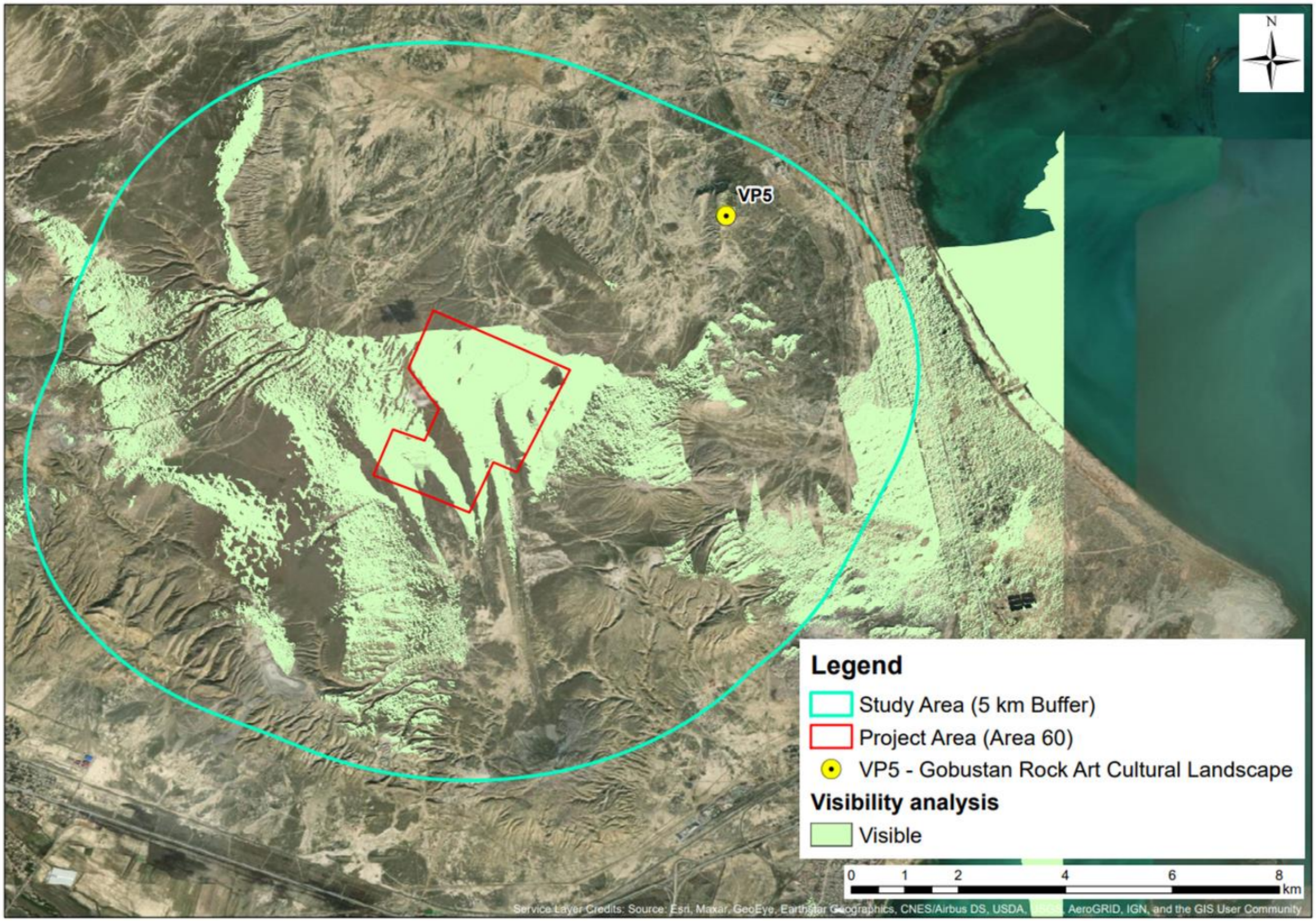


Figure 5-16: VP5 – Gobustan Rock Art Cultural Landscape; Observer height 1.7 m a.g.l.

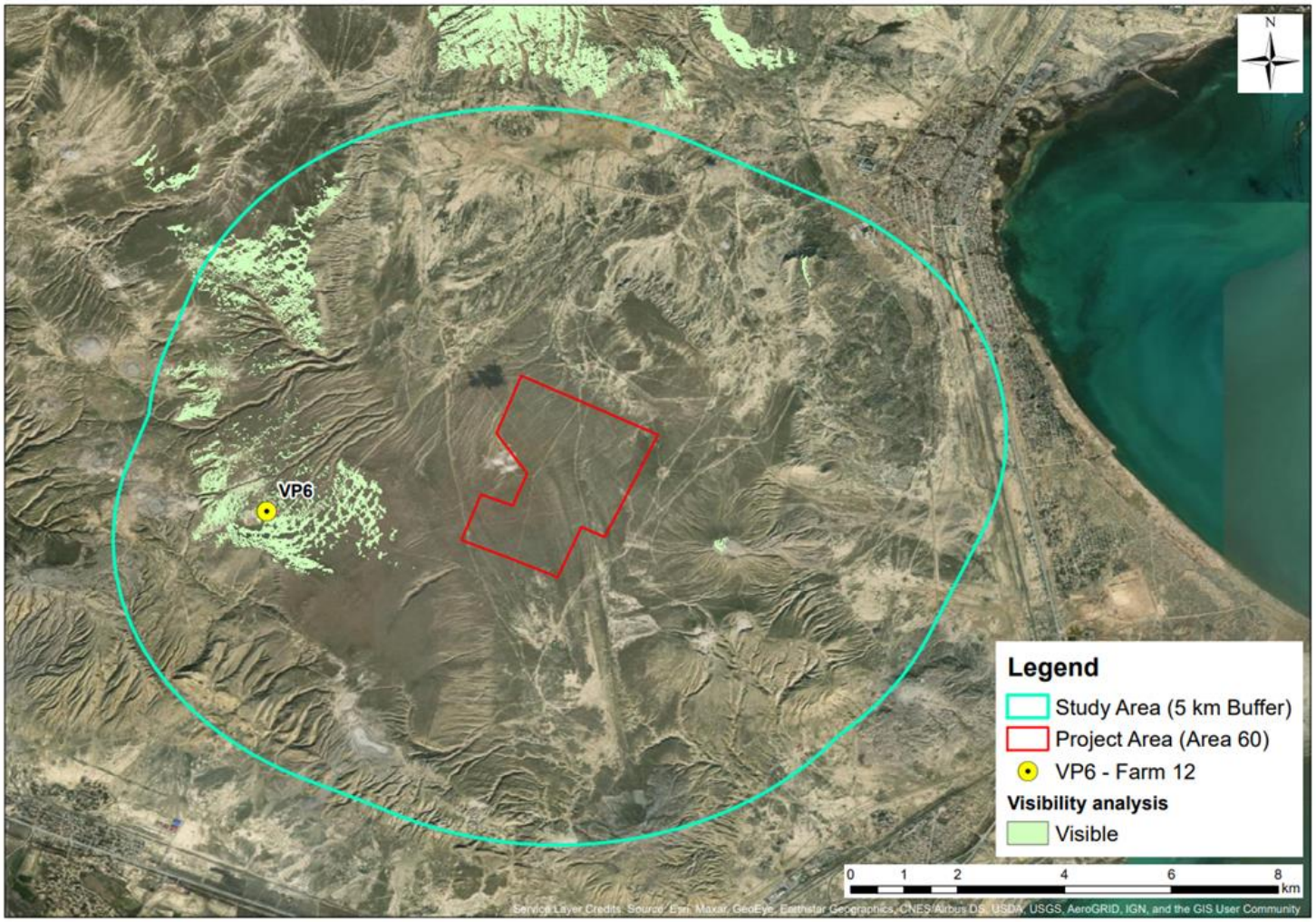


Figure 5-17: VP6 – Farm "ID 12"; Observer height 1.7 m a.g.l.

Table 5-2 below, summarises the impacts that would arise from the Project.

Table 5-2: Summary of Impacts on Visual Amenity

Receptors	Sensitivity	Magnitude*	Significance
VP1 Muslim Cemetery	Low	Negligible	Slight
VP2 Farm "ID-1"	Low	Medium	Slight
VP3 Goturdagh mud volcano	Medium	Medium	Moderate
VP4 Qobustan road	Low	Medium	Slight
VP5 Gobustan Rock Art Cultural Landscape	High	Medium	Moderate
VP6 Farm "ID-12"	Low	Negligible	No Change
Notes: *based on the Visibility Analysis maps			

The impacts have been assessed for both the construction phase and the operational life of the Project. Whilst it is acknowledged that some receptors would not be aware of phases of the construction programme, the assessment of construction impacts must consider the worst-case scenario, i.e., when solar panels are being erected. Consideration is also given to the visual impact experienced as a result of construction traffic, and this is reflected in the assessment.

The paragraphs below provide a description of the existing visual context for each of the viewpoint receptors followed by an explanation of the implications that the introduction of the Project would have on the existing view and evaluation of the significance of the impact on the view.

VP1: Muslim Cemetery

This viewpoint is located approximately 1.2 km from the north-western boundary of the Project area. View is predominately desert, and Farm 2 is visible in the distance, located about 3 km north far from the new Muslim cemetery.

The sensitivity of the viewpoint is considered to be **Low** as the view is not considered particularly unique or valuable as it is similar to views experienced across this part of the country. The magnitude of change is considered to be **Negligible** based on the ZTV analysis above. Figure 5-12 shows that the Project area is barely perceptible from VP1.

However, as clarified before, ZTV visibility analysis does not consider features such as trees or woodland, buildings and other structures or local landform, which can vary the ZTV locally and therefore the ZTV cannot be fully representative of visual impact. However, the ZTV is a valuable tool in assisting with the identification of areas of potential impact.

The impacts during construction and operation are therefore assessed as **Slight** and not significant as the Project would form a perceptible but not detracting feature within the view.

VP2: Farm "ID-1"

This viewpoint is located about 300 m from the eastern boundary of the Project area. View is predominately desert, and the topography is relatively flat in the centre ground with higher elevations in the far ground. The view is free from obstacles, the desert and mountainous expanse dominates the skyline, hence the Project will certainly be visible in the centre of the view.

The sensitivity of the viewpoint is considered to be **Low** as the view is not considered particularly unique or valuable as it is similar to views experienced across this part of the country. The magnitude of change is considered to be **Medium**. According to ZTV, Figure 5-13 shows that the Project area is a noticeable change from VP2 due to their reciprocal proximity.

The impact is therefore assessed as **Slight** and not significant as the Project would form a perceptible but not detracting feature within the view.

VP3: Goturdagh mud volcano

This viewpoint is located to the south of the Project representing a sensitive environmental element and a tourist attraction. The State Tourism Agency was consulted as part of the stakeholder engagement process. The agency indicated that the mud volcanos were the main tourist attraction in the area and, although they saw the Project as a positive benefit in terms of a clean and new source of energy, it was recommended to cover the solar panels as far as possible so that they are not visible (although noted this is not a feasible option).

The key feature of this VP is that it sits on an elevated position in relation to the Project site. The elevation value of the mud volcano is around 191 m a.m.s.l. The full Project site will be seen across the views from this point however it is noted that the Project will not break the skyline.

The sensitivity of the viewpoint is considered to be **Medium** as the view is considered unique or of particular importance. The magnitude of change is considered to be **Medium**. The impact is therefore assessed as **Moderate** as the Project would introduce some detracting features.

VP4: Qobustan road

This viewpoint is located on the Qobustan road that is the main route to reach the site from city. The VP is approximately 1.8 km in north-east direction far from the Project site. The view is free from obstacles, the desert and mountainous expanse dominates the skyline.

The sensitivity of the viewpoint is considered to be **Low** and the magnitude of change is considered to be **Medium**. The impact is therefore assessed as **Slight** as the Project would be a perceptible form but not detracting feature within the view.

VP5: Gobustan Rock Art Cultural Landscape

This viewpoint is located 3 km far in east direction from the Project area, within the WH Buffer Zone. The Ministry of Culture was consulted as part of the stakeholder engagement for the Project. The Ministry recognised landscape change as a potential impact although welcomed the potential for new infrastructure and employment.

The key feature of this VP is that it sits on an elevated position in relation to the Project site. The elevation value of this site varies from about 10 to 175 m a.m.s.l. This viewpoint was set on an elevation value of 150 m a.m.s.l. The full Project site will be seen across the views from this point however it is noted that the Project will not break the skyline and views will be at a distance.

The sensitivity of the viewpoint is considered to be **High** as it forms part of an important view. The magnitude of change is considered to be **Medium** during both construction and operation as the Project would, at a distance, result in a noticeable change to the existing view. The impact is therefore assessed as **Moderate** as the Project would introduce some detracting features to an existing well composed view, resulting in a noticeable deterioration of the view at this VP.

VP6: Farm "ID-12"

This viewpoint is located about 2.85 km from the western boundary of the Project area. View is predominately desert, and the topography is relatively flat in the immediate vicinity of the VP, rising to higher elevations in the mid ground. The desert and mountainous expanse dominates the skyline.

The sensitivity of the viewpoint is considered to be **Low** as the view is not considered particularly unique or valuable as it is similar to views experienced across this part of the country. The magnitude of change is considered to be **Negligible**. According to ZTV, Figure 5-17 shows that the Project area is not perceptible from VP6 due topography.

The impact is therefore assessed as **No Change** and not significant as the Project would not be perceptible within the view.

5.5 Mitigation Measures

5.5.1 Construction

The best form of mitigation for landscape and visual impacts arising from construction is related to conservation of soils. Measures include:

- Limiting soil damage by keeping the construction areas and roads to a minimum and maintaining strict requirements for vehicles to always remain on the roads.
- Reinstating soils where construction areas and roads are no longer required. This would reduce the duration of the visual impact.

Mitigation to reduce the adverse impact resulting from litter and garbage (plastic bags, bottles etc.) include:

- Provision of adequate facilities for the disposal of garbage.
- Training of the workforce in waste management.
- Reduce the amount of waste to the maximum extent possible.
- Collect all solid waste and store until transported to an appropriate waste disposal facility and disposed.
- Organization of clean-ups for existing garbage.

The construction schedule will be developed considering key sensitive features within the landscape including cemeteries, rock art and nearby farm structures. Consultation will be undertaken with relevant stakeholders in relation to the construction schedule. As far as is practicable, the schedule will take into consideration any sensitive events to ensure work is not planned in close proximity to receptors at any sensitive times to reduce visual disturbance.

5.5.2 Operation

Where significant impacts are identified, mitigation measures will be then developed.

The Project is expected to implement site rehabilitation and landscaping measures to restore the site in dedicated areas where feasible. This should be implemented in the first available active growing season following the completion of construction.

Landscaping and planting proposals to provide further screening will be considered and will be included in the Construction Environmental Management Plan (CEMP). The planting scheme would be developed prior to the operational phase of the development and implemented in the first available planting season following the completion of construction. This will provide screening to nearby sensitive receptors over the long term to include receptors located in proximity to the Project site. Planting proposed will be sensitive to, and in keeping with, the surrounding landscape.

These measures are intended to avoid, reduce, compensate, and/or remediate adverse impacts, or to enhance potentially beneficial impacts.

5.5.3 Residual Effects and Conclusions

It is noted that in relation to VP 3 and VP 5, whilst the implementation of planting may provide some limited screening of views from these locations, due to the raised elevation of the VPs screening benefits will be limited. It is therefore considered the residual visual effect remains Moderate at these locations.

Overall, taking into account proposed mitigation, the residual effect of the Project is considered to be Slight and not significant in the long-term.

6 Biodiversity

6.1 Introduction

This section documents the potential ecological and ornithological impacts of the Project and sets out their corresponding mitigation strategies for construction, operation and decommissioning of the Project. The ecological assessment on the Project site has been carried out by Sulaco Consultants (a development consulting firm based in Azerbaijan) on behalf of Wood.

6.2 Assessment Methodology

6.2.1 Baseline Data Collection

The Study Area encompasses the area within 10 km for the Project boundary. The Project AoI encompasses the area within 5 km of the Project boundary. This was defined through a review of the surrounding area and notable features (including designations) and incorporates the physical footprint of the Project from the clearance of the site and civil works associated with the installation of internal tracks and ancillary infrastructure.

The results of environmental studies carried out in July 2020 during the Scoping phase demonstrates that the available information on the biological resources of the Project Study area is limited. As there are very few references and information especially within the Project Area, findings from the field surveys have been key to providing a complete picture of the existing conditions at the Project.

During the 2020 site visit, the following activities took place:

- Identification of fauna and flora species present within the Project AoI particularly with regard to species and habitats of conservation importance, including:
    - species protected by local and international laws and conventions (e.g. protected by the Habitats Directive, Appendices I & II, Berne Convention and CITES Convention).
    - species under the threat of destruction according to the local and world Red Books (critically endangered, endangered and vulnerable).
    - endemic and / or species in a narrow range.
- Assessment of the presence of sensitive habitats in the Project AoI and in the wider vicinity.

- Description and photos of the identified representatives of fauna and flora including determination of the coordinates of the area of their presence using a portable GPS device. Samples of flora were also taken during the survey effort.

Appendix D of this ESIA provides the 2020 Ecological Survey Report.

In addition to the works already completed during the Scoping phase, the ESIA team identified the need for conducting an additional survey in April 2021, within a buffer of up to 5 km from the Project boundary, in order to better understand the ecological function and value of the Project AoI, supported by considerations about the whole Study Area (as defined in Chapter 4) when available. The April 2021 Ecology Report undertaken by Sulaco Consulting and Engineering is set out within Appendix E of this ESIA.

The methodology adopted for the preparation of the baseline assessment Is described further below.

6.2.1.1 Literature Review / Desk-based Studies

Collection, review, and analysis of the available literature data and publications was carried out to define the baseline environment and biodiversity characterizing the Study Area (approx. 10km buffer when available). To this end, both scientific/official literature and previous ESIA studies carried out for other proposed (in some cases never implemented) developments in the vicinity of the Project site have been accounted for. As listed in the following, the literature review considered several sources.

- Scientific publications and other official documents:
    - Azerbaijan Fifth National Report (CBD, 2014);
    - Ecological and Faunal Analysis of Herpetofauna of Qobustan (Institute of Zoology of the National Academy of Sciences of Azerbaijan, 2014)
    - Potential Analysis for Further Nature Conservation in Azerbaijan (2009);
    - Red Book of Azerbaijan (2013);
    - Biodiversity Analysis Update for Azerbaijan (USAID, 2010); and
    - Coastal Bird Migration at the Caspian Shore of the Azerbaijan Republic in October 2007 (Michael Heiss & Kai Gauger, Podoces 2011, Vol. 6, No. 1).
- ESIA studies and baseline reports for other projects located in the vicinity of the Project site:
    - Part I: Environmental Baseline and Social Impact Assessment for the construction of Oil & Gas Processing and Petrochemical Complex (ECOMERKEZ, 2011, Final Report);

  - Part II: Social Impact Assessment for the construction of Oil & Gas and Petrochemical Complex (ECOMERKEZ, 2011);
  - Part III: Environmental Positive Impact Assessment in connection with dismantling proper processing enterprises under SOCAR (ECOMERKEZ, 2011);
  - Azeri, Chirag and Gunashli Full Field Development Phase 1 - Environmental and Socio-Economic Impact Assessment (AA.VV., 2002);
  - Shallow Water Absheron Peninsula 3D Seismic Survey - Environmental and Socio-Economic Impact Assessment (AECOM for BP, 2015);
  - Shallow Water Absheron Peninsula 2D Seismic Survey - Environmental and Socio-Economic Impact Assessment (AECOM for BP, 2015);
  - Environmental Impact Assessment for Planned Well Drilling in the Southwest Contract Area (GOC, 2014);
  - Environmental Impact Assessment for Drilling of New Exploration and Exploration Wells in the Coastal Block of the Southwest Gobustan Agreement Area (GOC);
  - State Strategy for the "Use of Alternative and Renewable Energy Sources 2015-2020" - Strategic Environmental Assessment Report Project (MENR);
  - SOCAR Polymer - Environmental and Social Impact Assessment (ESIA) for PP & HDPE Plant (Golder, 2015);
  - SOCAR GPC LLC - ESIA Scoping for Gas Processing Plant & Polyethylene Plant Project (Golder, 2017);
  - Shah Deniz gas Export Project Stage 1 Development - Executive Summary (BP, 2002).
- Web sources:
  - MENR;
  - The IUCN Red List of Threatened Species. Version 2016-3, www.iucnredlist.org;
  - WWF database, http://www.worldwildlife.org/ecoregions;
  - Birdlife International, http://www.birdlife.org/;
  - Ramsar Convention website, http://www.ramsar.org/;
  - IBAT database, https://ibat-alliance.org/visual-data-map;
  - KBA database, http://www.keybiodiversityareas.org/site/mapsearch;
  - IUCN World Database on Protected Areas, https://www.iucn.org/theme/protected-areas; and

- World Database on Protected Areas, https://www.protectedplanet.net/country/AZ.

6.2.1.2 Field Survey Methodologies

Field surveys covered the Project footprint and immediate vicinity (up to 5 km AoI as needed to characterize sensitivities) on 09, 10, and 19 April 2021 by Sulaco Ltd experts. The survey entailed collecting biodiversity baseline data, assessing sensitive habitats and the ecological state of the proposed Project AoI, and ecosystem services that are found on the site.

The Project AoI was traversed in a regular pattern in order to reduce the chances of missing any important biotic features. The executed walkover survey was primarily aimed at:

- Identifying any terrestrial / avian fauna and flora species that may reside or range within the AoI.
- Taking photos of the identified representatives of fauna and flora and determining the coordinates of the area of their presence through a portable GPS device.
- Evaluating any potential seasonality as far as feasible by identifying any link between the findings of the survey conducted on field in Summer 2020 and in Spring 2021 respectively.
- Providing the International Union for Conservation of Nature (IUCN) Red Data rating and the status of protection/conservation for each species identified as present or potentially occurring at the Project site and AoI at both national and international level.
- Analysing the land cover of the area and mapping habitats to identify any sensitive or critical habitat according to IFC Performance Standards (IFC PS 6), EBRD Performance Requirement (PR) 6 and ADB Safeguard Policy.

Plant samples were taken for subsequent identification. Potential occurrence of terrestrial and avian fauna species within the Project site and AoI as part of the Study Area have been assessed and conveyed as a result of literature review and direct observations made during surveys performed at Scoping and ESIA stage.

Further high-level studies were also undertaken for the OHL cumulative development from 30 August to 01 September 2021.

6.2.2 Assessment of Impacts

As outlined in Chapter 4 of this document, the significance of an impact on an identified and valued receptor is determined as a relationship between the sensitivity of the receptor and the magnitude of the predicted impact. The specific impact assessment methodology applied to evaluate impact significance on biodiversity is discussed in detail in the following paragraphs.

6.2.2.1 Receptor Sensitivity

For ecological receptors, the sensitivity of the receptor considers the following factors:

- The occurrence and significance of any nature conservation designations that may apply to the receiving site/habitat.
- The presence and sensitivity of any scarce, rare, protected or otherwise notable species of fauna or flora.
- The sensitivity and value of the receiving habitat, in terms of its relative extent, fragility (including its ability to recover), and rarity.

Table 6-1 and Table 6-2 show the criteria for assessing the sensitivity of ecological receptors (habitats and species respectively).

Table 6-1: Sensitivity of Ecological Receptors (Habitats)

Sensitivity	Description	Applicable Legal Standards
High (D)	An area which has designated conservation status categories Ia to IV under the IUCN Classification. Critical habitats of significant international or national ecological importance.	**International:** Designated areas or habitat under IUCN category Ia to IV (Habitat/Species Management Area and above These include: • Category Ia — Strict Nature Reserve • Category Ib — Wilderness Area • Category II — National Park • Category III — Natural Monument or Feature • Category IV — Habitat/Species Management Area • Global-level Key Biodiversity Areas and Important Bird and Biodiversity Areas identified for restricted-range species.
Moderate (C)	A site, habitat or assemblage of species which has designated conservation status at a National scale. Threatened habitats or Significant biodiversity features identified by a broad set of stakeholders or governments (such as Key Biodiversity Areas or Important Bird Areas). Undesignated habitats which are unmodified by human activity and comprise native species forming assemblages consistent with the prevailing environmental conditions.	Not applicable.
Low (B)	Habitats occurring outside of any designation which are subject to active management or alteration through human activity, but with an assemblage of species which is predominantly native in origin.	Not applicable.
Negligible (A)	Habitats which are either appreciably degraded/disturbed by human activity or have high proportions of invasive/non-native species.	Not applicable.

Table 6-2: Sensitivity of Ecological Receptors (Species)

Sensitivity	Description	Applicable Legal Standards
High (D)	A species population which has designated conservation status at an international or national scale of 'Endangered' or above. A species qualifying the site as Critical Habitat for criteria other than those listed above, e.g., endemic species with a range of <50,000 km.	**International:** - Listed in IUCN Red List category of Endangered (EN) or Critically Endangered (CR). - Listed in Appendix I, Appendix II, Appendix III, and Appendix IV of the Bern Convention on the Conservation of European Wildlife and Natural Habitats (Bern)[26]. - Listed in Appendix I and Appendix II of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)[27]. **Azerbaijan:** Listed in the Red Book of Azerbaijan (2013)
Moderate (C)	A species population which has designated conservation status at an international or national scale of 'Vulnerable'. A species population which has designated conservation status at a Regional scale of 'Vulnerable' or above. A species qualifying as a Priority Biodiversity Feature.	**International:** - Listed in the IUCN Red List category as Vulnerable (VU). - Listed in Appendix III of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES).

[26] Bern Convention appendices are Appendix I "Strictly protected flora species", Appendix II "Strictly protected fauna species", Appendix III "Protected fauna species", and Appendix IV "Prohibited means and methods of killing, capture and other exploitation".

[27] CITES appendices are Appendix I (including species that are threatened with extinction and are/may be affected by trade), Appendix II (including species that are not necessarily threatened with extinction but may become so unless trade in specimens of such species is subject to strict regulation), and Appendix III (including species that are protected in at least one country, which has asked other CITES Parties for assistance in controlling the trade).

Sensitivity	Description	Applicable Legal Standards
Low (B)	With a Regional designation of 'Near Threatened' or below. Not critical to other ecosystem functions (e.g. as prey to other species or as predator to potential pest species). Common nationally.	**International:** Listed in the IUCN Red List category as Near Threatened (NT).
Negligible (A)	Common / abundant locally. Not important to other ecosystem functions.	**International:** Listed in the IUCN Red List category as Least Concern (LC).

6.2.2.2 Impact Magnitude

The magnitude of any ecological impact (negative or positive) is determined as a relationship between the extent, frequency, duration, and reversibility of the potential impact. These key factors are discussed in detail below.

Extent

The extent of an impact is determined by the area of habitat over which an impact occurs or in respect to species the size of the population (local, national or international) which could be affected.

Timing and Frequency

Impacts on ecological receptors could result in a negative effect if these impacts coincide with critical life-stages or seasons (e.g. breeding season, migration or hibernation). The frequency of an impact is also considered. A single event (disturbance), irrespective of timing, may not result in a significant impact however more frequent disturbance events could result in a significant impact.

Duration

Another consideration in determining the magnitude of an impact is the duration, whether the impact would be temporary or permanent, and if they were temporary whether they would be short-, medium-, or long-term. Defining the duration of the impact can be subjective, depending on the ecological characteristics of the receptor (e.g. life-cycle, breeding age or recovery time).

Reversibility

Reversibility of an impact is determined by how likely the ecological receptor is to recover, within a reasonable timeframe, from an impact. A permanent impact is one from which recovery is not possible or for which there is no reasonable chance of mitigation being completed to reverse it. A temporary (reversible) impact is one from which recovery is possible or for which effective mitigation is both possible and enforceable.

The frameworks for defining the magnitude of impacts on habitats and species are presented in Table 6-3 and Table 6-4.

Table 6-3: Impact Magnitude (Habitats)

Magnitude	Description
High (4)	The impact has the potential to adversely affect the integrity of an area/region, by substantially changing in the long term its ecological features, structures and functions, across its whole area, that enable it to sustain the habitat, complex of habitats and/or population levels of species that makes it important.
Moderate (3)	The area/region's integrity is predicted to not be adversely affected in the long term, but the Project is likely to affect some, if not all, of the area's ecological features, structures and functions in the short or medium term. The area/region may be able to recover through natural regeneration and restoration.
Low (2)	Neither of the above applies, but some minor impacts of limited extent, or to some elements of the area, are evident but easy to recover through natural regeneration.
Negligible (1)	Indiscernible from natural variability.

Table 6-4: Impact Magnitude (Species)

Magnitude	Description
High (4)	Impact on a species that affects an entire population 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, or when there is no possibility of recovery.
Moderate (3)	Impact affects a portion of a population and may bring about a change in abundance and/or a reduction in the distribution over one or more generations but does not threaten the long-term integrity of that population or any population dependent on it. The size and cumulative character of the consequence is also important. A moderate magnitude impact multiplied over a wide area would be regarded as a high magnitude impact.
Low (2)	A low magnitude impact on a species affects a specific group of localized individuals within a population over a short time period (one generation or less), but does not affect other tropic levels or the population itself.
Negligible (1)	Indiscernible from natural variability.

6.2.2.3 Impact Significance

The relationship between receptor sensitivity and impact magnitude, and the resultant significance of an impact (positive or negative), is shown in the figure below.

		Receptor Sensitivity			
		Negligible	**Low**	**Moderate**	**High**
Impact Magnitude (extent, timing & frequency, reversibility, duration)	**Negligible**	Not significant	Not significant	Not significant	Not significant / Low
	Low	Not significant	Low	Low / Moderate	Moderate
	Moderate	Not significant	Low / Moderate	Moderate	High
	High	Low	Moderate	High	High

Figure 6-1: Impacts Significance Matrix

6.3 Baseline Conditions

The Study Area is situated in the semi-desert landscape type/ecosystems of the ecoregion known as "*PA1305 - Azerbaijan Shrub Desert and Steppe*", which is considered part of the "*Deserts and Xeric Scrublands Biome*". The three main primary zonal landscape types/ecosystems within this region are: desert and semi-desert; arid open woodland; and steppe. In addition, there are two intra-zonal/azonal types: flood plain (riparian) forest along the rivers; and wetlands.

Fauna diversity is especially remarkable in the PA1305 ecoregion, hosting one of the highest numbers of endemic[28] and endangered species characteristic of arid ecosystems in the Caucasus. The region coastal areas and wetlands are particularly important for birds during migrating and wintering periods.

[28] According to the IFC's Guidance Note 6 (GN79, 2012), an endemic species is defined as a species having ≥95% of its global range inside the country or region of interest.

6.3.1 Designated Areas

As shown in Figure 6-2, no national and international designations are identified within the Project site. The "Gobustan Reserve" Important Bird and Biodiversity Area (IBA) and Key Biodiversity Area (KBA) however has been identified within the Study Area (10 km buffer) and AoI (5 km buffer), the closest to the Project site. This area is a State Nature Reserve which meets the IBA criteria B3 "*Regionally important congregations*" and is identified as including species of global conservation concern.

The Gobustan IBA and KBA boundary is located approximately 1.5 km east – north-east of the Project site and extends for 5,000 ha. According to the information reported by BirdLife International, this area is characterized by low, semi-arid mountains, including the flat summits of Beukdash, Kichikdash, Kagnizdag, Djingirdag and the dry stream of Djeirankechmez. Some trees and bushes may be found on the eastern slopes (i.e. wild Pyrus, Ficus, Punica, etc.). The central and southern part of the IBA-KBA is covered wholly, while the northern section partly, by the Gobustan State Historical and Cultural Reserve, which was established to safeguard archaeological artifacts.

There have been past quarrying activities for limestone in the area which has taken place historically. Threats to biodiversity characterizing the Goubustan area may come from sheep and cattle grazing and from disturbance related to tourists and low-flying military aircraft.

As reported in Table 6-5 and according to the International Biodiversity Assessment Tool (IBAT) and BirdLife Datasets, the key biodiversity inhabiting the Qobustan IBA-KBA includes species of global conservation concern (birds and reptiles). Among these latter, the only threatened species is the Common Tortoise (*Testudo graeca*), assessed as Vulnerable according to the IUCN Red List.

Species highlighted in grey indicate the species that triggered the IBA notification at the time of designation.

Table 6-5: Key species inhabiting the Qobustan IBA-KBA (birds and reptiles)

Species Common & Scientific Name	Data (IUCN - BirdLife International Datasets)	Population Trend (IUCN Red List)	Threatening Status (IUCN Red List)
Lesser Kestrel - *Falco Naumanni*	Non-breeding Rare summer visitor	Stable	Least Concern (LC)
Long-legged Buzzard - *Buteo Rufinus*	Breeding	Stable	Least Concern (LC)
Chukar - *Alectoris Chukar*	Breeding, Rare	Stable	Least Concern (LC)
Rufous-tailed Scrub-robin - *Cercotrichas Galactotes*	Breeding	Stable	Least Concern (LC)
Pied Wheatear - *Oenanthe Pleschanka*	Breeding	Stable	Least Concern (LC)
Oenanthe Finschii	Breeding	Stable	Least Concern (LC)
Finsch's Wheatear - *Pyrrhocorax Pyrrhocorax*	Breeding	Decreasing	Least Concern (LC)
Rock Sparrow - *Petronia Petronia*	Breeding	Increasing	Least Concern (LC)
Black-headed Bunting - *Emberiza Melanocephala*	Breeding	Unknown	Least Concern (LC)
Western Rock Nuthatch - *Sitta neumayer*	Resident	Stable	Least Concern (LC)
Common Tortoise - *Testudo graeca*	Resident	Unspecified	Vulnerable (VU)

Additionally, the following protected areas are located outside of the Project AoI (Figure 6-2):

- "Alat Bay – Baku Archipelago" is a KBA located around 5.8 km from the Project site towards the east, outside of the AoI and extends for 11,992 ha along the coastline. According to IBAT Dataset, the White-headed Duck (*Oxyura leucocephala*, EN) results to be resident in this area.

- "Sangachal Bay" is an IBA located around 12.5 km to the north-east, extending for 4,000 ha. This is outside of the Study Area and AoI. This costal IBA is characterized by sandy beaches and some small wetlands stretching along the coast, many of which are overgrown with reeds vegetation. According to IBAT and BirdLife Datasets, the site is notable mostly for migrating and wintering waterbirds. At least 20,000 diving ducks and 30,000 coots stage here every Autumn, while 177 species of birds were noted at the place in different seasons, most of which are migratory visitors. The following species represent the key biodiversity of the area: Whooper Swan (*Cygnus Cygnus*, LC), Red-crested Pochard (*Netta Rufina*, LC), Tufted Duck (*Aythya fuligula*, LC), Common Coot (Fulica atra, LC), Great White Pelican (*Pelecanus onocrotalus*, LC), Great Cormorant (*Phalacrocorax carbo*, LC), Great Crested Grebe (*Podiceps cristatus*, LC) and waterbirds. As rare migrating visitors it should be mentioned: Pygmy Cormorant (*Phalacrocorax pygmeus*), Dalmatian Pelican (*Pelecanus crispus*, NT), Red-breasted Goose (*Branta ruficollis,* VU), Pallid Harrier (*Circus macrourus,* NT), Greater Spotted Eagle (*Aquila clanga,* VU), Eastern Imperial Eagle (*Aquila heliacal*, VU)*,* Lesser Kestrel (*Falco naumanni*, LC) and Little Bustard (*Tetrax tetrax*, NT). Other passage visitors include Greylag Goose (*Anser answer*, LC), Black-winged Stilt (*Himantopus himantopus*, LC), White Winged-tern (*Chlidonias leucopterus*, LC), Caspian Tern (*Sterna caspia*, LC) and many others. The typical desert ephemeral plants are present at the site and there are some overgrows of reed along the seacoast. Some mammals like European Hare (*Lepus europaeus*, LC), Grey Wolf (*Canis lupus*, LC), Golden Jackal (*Canis aureus*, LC) and Red Fox (*Vulpes Vulpes*, LC) occur at the site.

  The main threat for this site is industrial expansion connected with oil extraction. The area also suffers from pollution from industrial activities and poaching and fishing activities. Some small wetlands were drained resulting in reduction of nesting habitat and the construction of piers caused disturbance to wintering birds.

- "Glynanyi Bay" is an IBA located around 11.5 km from the Project site to the south-east, extending for 200 ha (outside of the Project AoI and Study Area). Glynanyi is the largest island of the Baku archipelago, volcanic in origin, and almost devoid of vegetation because of its large rabbit population. According to IBAT and BirdLife Datasets, the following species represent the key biodiversity of the area: Whooper Swan (*Cygnus Cygnus*, LC), Collared Pratincole (*Glareola pratincole*, LC), Caspian Gull (*Larus cachinnans*, LC), Ruddy Shelduck (*Tadorna ferruginea*, LC), Common Tern (*Sterna hirundo*, LC) and Little Tern (*Sternula albifrons*, LC).

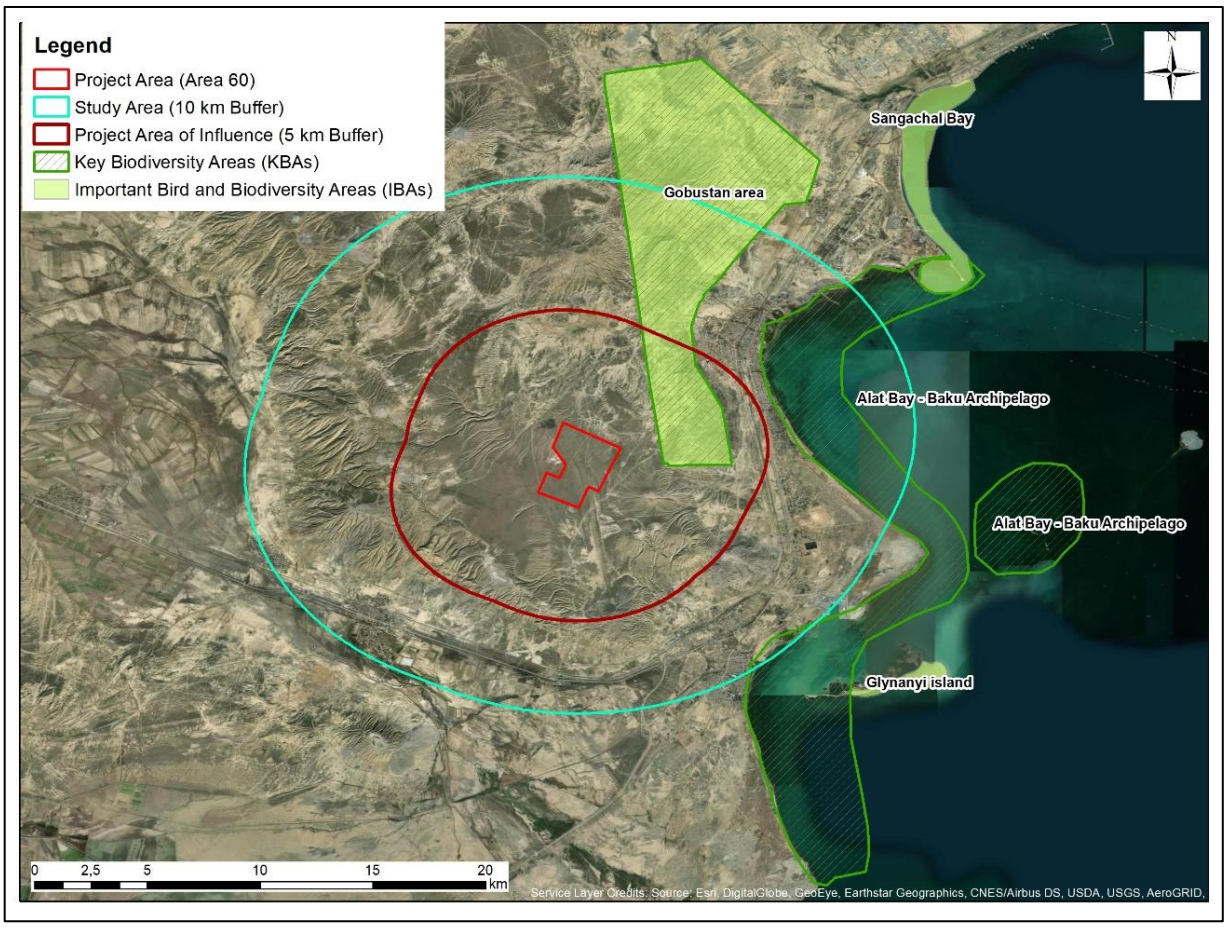


Figure 6-2: Distribution of IBAs and KBAs in the surroundings of the Project Area and the Study Area.

6.3.2 Flora

Generally, the Study Area is poorly studied from the herpeto-floristic point of view. The diversity and phytomass of plant species are very scarce, the nature of the vegetation changes depending on the availability of water and its salinity. Generally, the Absheron Peninsula vegetation is mainly composed of:

- **"***Desert flora*" (Figure 6-3 on the left) including ephemerals, which are semidesert plant communities formed under conditions of deficiency of moisture and mineral nutrition elements, high temperatures and excessive insolation, growing in flooded areas, on sand or in shallow lagoons; and
- "*Steppe flora*" (Figure 6-3 on the left) including shrubs and halophytes, prominent representative species of which is saltwort.

Figure 6-3: Typical vegetation cover in the Absheron Peninsula.

The vegetation present in the Project AoI results to be heavily disturbed by past and present human activities, including heavy grazing and industrial development connected with oil and gas processing activities and infrastructures.

The flora inhabiting the Project site and its surroundings within the Project AoI can be divided into the three different floristic groups discussed in the following.

- Semi-Desert Vegetation: Semi-desert vegetation covers a large portion of the Project site itself and its immediate vicinity (at a distance of 500 to 1,000 m), while vegetation is rarely found in rocky areas of the site. The observed flora species within the semi-desert vegetation are characteristic of arid climate regions and clay/saline soil terrain with very low organic content.

  Semi-desert vegetation is mostly characterized by *Salsoletum* vegetation community. The main components of the semi-desert flora are the low perennial bushes wormwood and saltwort species, and ephemeral species (*Salsola dendroides*, *Salsola ericoides*, *Salsola nodulosa*, *Suaeda microphylla*, *Artemisia lerchiana*), often accompanied by low-growing herbaceous forb species and grasses (*Medicago minima*, *Medicago coerulea*, *Poa bulbosa*, *Bromus japonicus*, *Lolium rigidum*, *Eremopyrum orientale*, *Erodium cicutarium*, *Brassica Napus L.*).

In areas where the soils salinity increases, more halophytic species like Bluish saltwort (*Suaeda glauca*) and Small leaved seablite (*Suaeda microphylla*), together with other salt tolerant shrub species (*Kalidium caspicum*, *Halocnemum strobilaceum*), result to be more frequent.

Large areas are lacking natural vegetation and present bare exposed soil. This situation is at least partially due to excessive livestock grazing and trampling that exacerbate soil erosion from rain and wind.

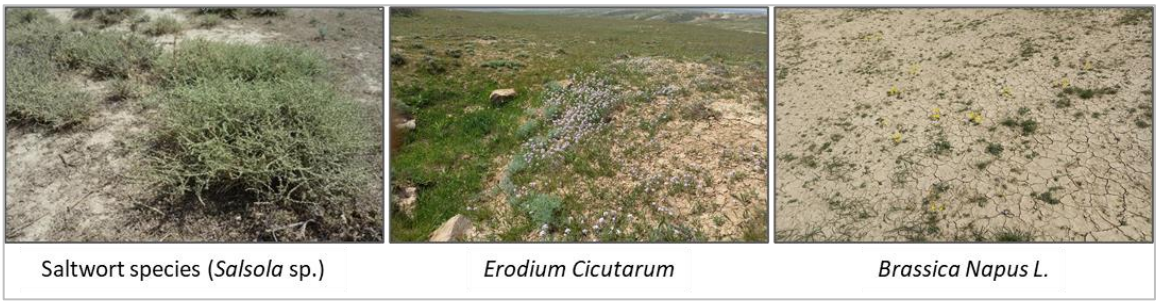


Figure 6-4: Pictures of flora species belonging to the semi-desert vegetation observed during the surveys within Project site.

- Riverine Vegetation: Riverine vegetation has been detected in the bed of a dry, untitled temporary/ephemeral stream with two tributaries located within the AoI crossing the village of Gobustan and flowing into the Caspian Sea, located approx. 6.5 km north of the Project site. In the depressions created by the ephemeral stream, the quantity of flora specimen increases and includes tamarisk, which is a shrub with no agricultural value, or salt cedar thickets (*Tamarix meyeri*, *Alhagi pseudoalhagi*, *Juncus acutus*, *Salicornia europaea*). Where the stream forms temporary ponds of almost stagnant water some small stands of common reeds (*Phragmites australis*) can also be observed. The effects of trampling from livestock have been observed in these areas.

Figure 6-5: Pictures of flora species belonging to the riverine vegetation observed during the surveys nearby ephemeral stream.

- Wetland Vegetation: Intra-zonal wetland vegetation can be found approx. 1 km from the coast in the Gobustan area, where the freshwater from the river forms a series of connected marshes before entering the Caspian Sea. These wetlands developed as a consequence of the construction of Baku-Salyan Highway, adjacent railway line, and the pipeline corridor between the railway line and the Sangachal Terminal.

  These marshes are dominated by common reeds (*Phragmites australis*), also observed as part of riverine vegetation at temporary ponds location, and Broadleaf cattail (*Typha latifolia*). Seasonally inundated areas characterized by barred mudflats colonised by Glasswort (*Salicornia europaea*) are also present.

  These areas are impacted by industrial developments and infrastructures such as pipelines, roads, powerlines and water discharges that modify the hydrology of the area and pose a risk of pollution.

None of the above-mentioned flora species observed, belonging to semi-desert, riverine, and wetland vegetation, are classified as Critically Endangered (CR), Endangered (EN), or Vulnerable (VU), according to the IUCN criteria, are listed in the Red Book of Azerbaijan (2013) or are range restricted.

It is worth mentioning that two endemic species, Baku Calligonum (*Calligonum bakuense*) and Baku Astragalus (*Astragalus bacuensis*), were identified in the past in the Sangachal area, north of the Project site (outside the Project AoI of 5 km).

According to the results of studies carried, *Astragalus caspica, Astragalus stevenianus* and *Astragalus aureus* are occasionally found outside of the AoI in the semi-desert where there is very little anthropogenic impact. *Bilacunaria caspia* was also not found in the AoI.

Azerbaijan invasive plant species include the widely distributed Common ragweed (*Ambrosia artemisiifolia*) and the Buffalo bur nightshade (*Solanum rostratum*), both native to North America. In particular, the former is a very competitive weed that can produce yield losses in soybeans as high as 30%, whereas the latter usually grows in waste and disturbed areas and is especially common in overgrazed pastures.

According to the review of literary sources on alien species of Azerbaijan, there are currently 72 invasive species belonging to 23 families in the flora of Azerbaijan. The largest number of representatives are included in the families Asteraceae Dumont, *Poaceae Barnhart* and *Amaranthaceae Iuss*.

Neither endemic nor invasive flora species were however observed during the 2020 nor the 2021 field surveys executed at the Project area and its surroundings. There were also no signs of penetration of alien (invasive) species into the natural flora of the Project area and its surrounds.

6.3.3 Fauna

The semi-desert landscape type/ecosystems of PA1305 ecoregion "*Azerbaijan Shrub Desert and Steppe*" hosts species typical of arid ecosystems and it is notable for its reptile diversity.

However, most of the AoI is situated in relatively homogenous clay/saline soil terrain, with very low vegetation cover that has been deteriorated by anthropogenic activities. Enclosures of higher biodiversity value are expected within the riverine vegetation and wetlands with particular reference to amphibians, reptiles, and migrating bird species which have not been identified within the Project footprint. Mammal species are also attracted by these "oasis" of vegetation.

The baseline assessment reported below focuses on the most relevant taxa: mammals, reptiles, amphibians, and birds.

6.3.3.1 Mammals

Generally, habitats characterizing the wider Study Area could host only a limited number of small to medium size mammals, while the use of the AoI by medium to large size species is probably limited to rare occasional visits. Common mammals include jackals (*Canis aureus*, LC) and wolves (*Canis lipus*, LC), which follow flocks of sheep to their wintering areas, and the red fox (*Vulpes vulpes*, LC), which is one of the permanent inhabitants of the Study Area. Other typical mammals might be house mouse specie, bats, weasels, polecats, and badgers.

As shown in Figure 6-6, during the field surveys several tracks and excrements probably belonging to Red fox (*Vulpes vulpes*) and the European hare (*Lepus europaeus*) were observed. Several dens of mice were found over the entire surveyed area, especially close to the temporary stream' banks north of the Project site.

Based on the literature review performed and the evidence collected during the site visits, a total of 38 mammal species were found to be potentially present within the AoI (Table 6-6). Out of these species:

- Marbled polecat (*Vormela peregusna*) is the only species considered vulnerable (VU) at a global level according to the IUCN Red List. This has not been found in the AoI but are occasionally found in areas with little anthropogenic impact.
- Two species (Marbled polecat, VU - *Vormela peregusna*, and Schreiber's Bent-winged bat, NT - *Miniopterus schreibersii*) are listed in the Red Data Book of Azerbaijan these have not been found within the AoI.
- Three species of mammals (Grey Wolf, LC - *Canis lupus*, Marbled polecat, VU - *Vormela peregusna*, and Schreiber's Bent-winged Bat, NT - *Miniopterus schreibersii*) are included in Appendix II of the Bern Convention, while other two of the listed species (Eurasian Badger, LC – *Meles meles*, and Least Weasel, LC - *Mustela nivalis*) are included in Appendix III of the Bern Convention.
- In the AoI, especially in the nearby livestock farms, the presence of restricted range species of Striped fieldmouse (*Apodemus agrarius*) and Grey dwarf hamster (*Cricetulus migratorius Pallas*) has been confirmed.
- No endemic or range-restricted species were found or are expected to be present within the AoI.

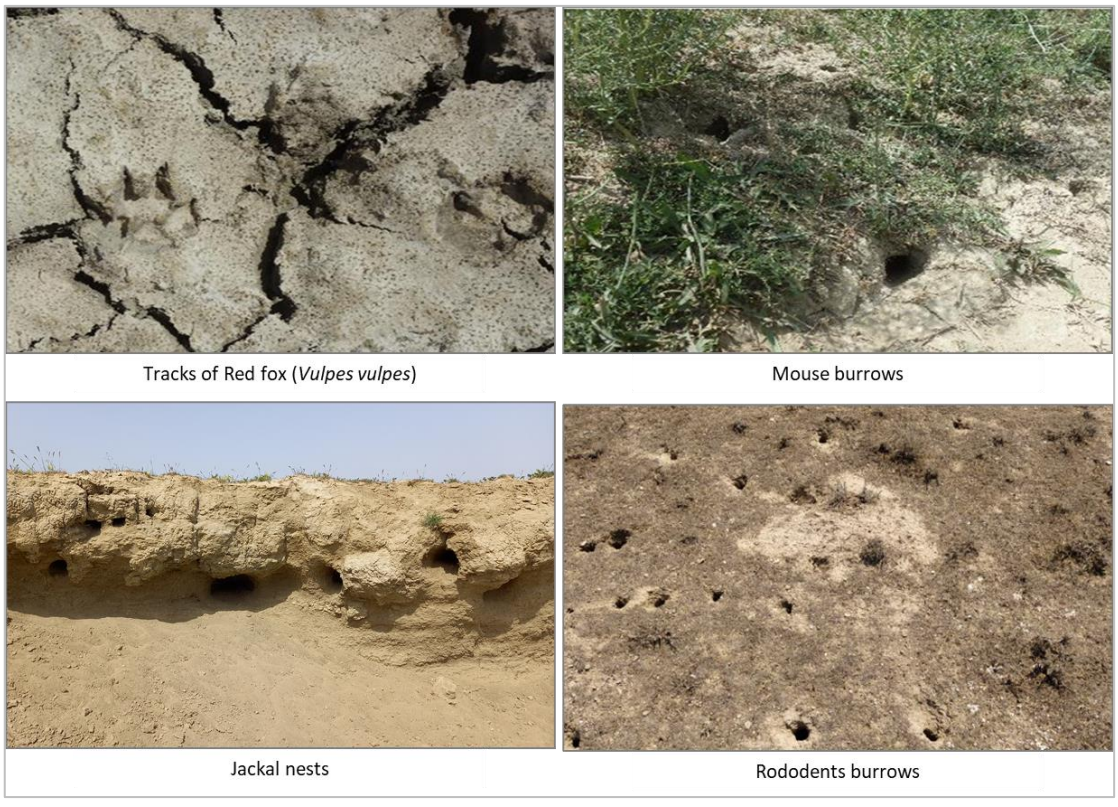


Figure 6-6: Evidence of mammals' presence observed during the surveys within Project site.

Table 6-6: Mammal species potentially present in the AoI

Order	Family	Species	End.	Conservation Status		Protection Status		Obs. / Liter.
				IUCN	Az. RDB	BERN	CITES	
Carnivora	*Canidae*	Golden jackal (*Canis aureus)*	-	LC	No	-	-	L
		Wolf (*Canis lupus)*	-	LC	No	App. II	App. II	L
		Red fox (*Vulpes vulpes)*	-	LC	No	-	-	L
	Felidae	*Jungle cat (Felis chaus)*	-	LC	No	-	App. II	L
	Mustelidae	European badger (*Meles meles)*	-	LC	No	App. III	-	L
		Marbled polecat (*Vormela peregusna)*	-	VU	Yes	App. II	-	L
		Least weasel (*Mustela nivalis)*	-	LC	No	App. III	-	L
Cetartiodactyla	*Suidae*	Wild boar (*Sus scrofa)*	-	LC	No	-	-	L
Chiroptera	*Miniopteridae*	Common Bent-wing Bat *(Miniopterus schreibersii)*	-	NT	Yes	App. II	-	L
	Vespertilionidae	Asian Barbastelle Bat *(Barbastella leucomelas)*	-	LC	No	App. II	-	L

Notes:
- "End." means endemic species as defined by the IFC's Guidance Note 6 (GN79, 2012).
- IUCN Threatening levels: "DD" = Data Deficient, "NE" = Not Evaluated at Country level, "LC=" = Least Concern, "NT" = Near Threatened, "VU" = Vulnerable.
- "Az. RDB" means Red Data Book of Azerbaijan.
- "Obs./ Liter." reports if species have been identified as potentially present in the Study Area through literature review (L), or species have been observed in the Study Area during the site visit (O).

6.3.3.2 Reptiles

Data about the species reported to be present in the wider Study Area according to bibliography (listed under section 6.2.1) includes several reptiles mainly represented by snakes and lizards. Based on the data collected through literature review and considering the on-site observations, a total of n.18 reptile species resulted to be potentially present within the investigated area (Table 6-7). Out of these species:

- Two specimens have been observed (Figure 6-7) - A snake, possibly Schmidt's whip snake (*Dolichophis schmidti*, LC), that was identified in an abandoned structure within the AoI, and a dead individual of European pond turtle (*Emys orbicularis*, NT), which was detected at mudflats located near wetlands.
- Common tortoise (*Testudo graeca*) is the only species considered threatened (Vulnerable - VU) at global level according to the IUCN Red List and listed in the Red Data Book of Azerbaijan. No tortoises were found during the survey effort, nor were any signs of their presence within the AoI.
- Two species of snakes (Cat snake, LC - *Telescopus fallax*, and Dice snake, LC - *Natrix tessellata*) and two species of tortoises (European pond turtle, NT - *Emys orbicularis*, and Common tortoise, VU - *Testudo graeca*) are included in Appendix II of the Bern Convention, while almost all the other listed species are included in Appendix III of the Bern Convention.
- No endemic or range-restricted species were found or are expected to be present within the area of interest.

Sensitive periods for reptiles in the area of interest are expected to be the months from April to August, when breeding and incubation occur but also, hibernation periods if ground is disturbed (mid-October to March).

European pond turtle (*Emys orbicularis*)

Possibly Schmidt's whip snake (*Dolichophis schmidti*)

Figure 6-7: Dead European pond turtle and a snake, possibly Schmidt's whip snake, photographed during the surveys within AoI (not within Project footprint itself).

Table 6-7: Reptile species potentially present in the AoI

Order	Family	Species	End.	Conservation Status		Protection Status		Obs. Liter.
				IUCN	Az. RDB	BERN	CITES	
Squamata	*Gekkonidae*	Caspian bent-toed gecko *(Tenuidactylus caspius)*	-	LC	No	App. III	-	L
	Lacertidae	Steppe-runner *(Eremias arguta)*	-	NT	No	App. III	-	L
		Central Asian racerunner *(Eremias velox)*	-	LC	No	App. III	-	L
		Snake-eyed lizard *(Ophisops elegans)*	-	LC	No	App. II	-	L
		Sunwatcher toadhead agama *(Phrynocephalus helioscopus)*	-	LC	No	App. III	-	L
	Boidae	Javelin sand boa *(Eryx jaculus)*	-	LC	No	App. III	App. II	L

Order	Family	Species	End.	Conservation Status		Protection Status		Obs. Liter.
				IUCN	Az. RDB	BERN	CITES	
Squamata	*Colubridae*	Red-bellied racer *(Dolichophis schmidti)*	-	LC	No	App. III	-	O/L
		Collared dwarf snake *(Eirenis collaris)*	-	LC	No	App. III	-	L
		Ring-headed dwarf snake *(Eirenis modestus)*	-	LC	No	App. III	-	L
		Dahl's whip snake *(Platyceps najadum)*	-	LC	No	App. III	-	L
		European cat snake *(Telescopus fallax)*	-	LC	No	App. II	-	L
	Natricidae	Dice Snake *(Natrix tessellata)*	-	LC	No	App. II	-	L
	Psammophiidae	Montpellier snake *(Malpolon monspessulanus)*	-	LC	No	App. III	-	L
Testudines	*Scincidae*	Berber skink *(Eumeces schneideri)*	-	LC	No	App. III	-	L
	Viperidae	Blunt-nosed viper *(Macrovipera lebetina)*	-	LC	No	App. III	-	L
	Emydidae	European pond turtle *(Emys orbicularis)*	-	NT	No	App. II	-	O

Order	Family	Species	End.	Conservation Status		Protection Status		Obs. Liter.
				IUCN	Az. RDB	BERN	CITES	
	Emydidae	Caspian turtle *(Mauremys caspica)*	-	NE	No	-	-	L
	Testudinidae	Common Tortoise *(Testudo graeca)*	-	VU	Yes	App. II	App. II	L

Notes:
- "End." means endemic species as defined by the IFC's Guidance Note 6 (GN79, 2012).
- IUCN Threatening levels: "DD" = Data Deficient, "NE" = Not Evaluated at Country level, "LC=" = Least Concern, "NT" = Near Threatened, "VU" = Vulnerable.
- "Az. RDB" means Red Data Book of Azerbaijan.

"Obs./ Liter." reports if species have been identified as potentially present in the Study Area through literature review (L), or species have been observed in the Study Area during the site visit (O).

6.3.3.3 Amphibians

The occurrence of amphibian species is strictly connected to the presence of wet areas and wetland vegetation since they depend on water at least for their reproduction. Sensitive periods for amphibians in the area of interest are expected to be the months from April to August, when breeding and incubation occur but also, hibernation periods if ground is disturbed (mid-October to March).

Four different amphibians have been identified as potentially present within the Study Area based on information collected through the literature review, while no amphibians have been observed during the site visit (Table 6-8).

None of the species listed in the table below are considered threatened according to IUCN standards. However, the European tree frog (Hyla arborea) results to be included in the Red Data Book of Azerbaijan and almost all the reported species are included in Appendix II and Appendix III of the Bern Convention. No endemic species were found or are expected to be present within the Study Area.

No endemic or range restricted species were found or are expected to be present within the area of interest.

Table 6-8: Amphibian species potentially present in the AoI

Order	Family	Species	End.	Conservation Status		Protection Status		Obs. / Liter.
				IUCN	Az. RDB	BERN	CITES	
Anura	*Bufonidae*	Eurasian Green toad (*Bufotes variabilis)*	-	DD	No	-	-	L
	Ranidae	European tree frog (*Hyla arborea)*	-	LC	Yes	App. II	-	L
		Long-legged wood frog *(Rana macrocnemis)*	-	LC	No	App. III	-	L
		Marsh frog (*Pelophylax ridibundus)*	-	LC	No	App. III	-	L

Notes:
- "End." means endemic species as defined by the IFC's Guidance Note 6 (GN79, 2012).
- IUCN Threatening levels: "DD" = Data Deficient, "LC=" = Least Concern.
- "Az. RDB" means Red Data Book of Azerbaijan.
- "Obs./ Liter." reports if species have been identified as potentially present in the Study Area through literature review (L), or species have been observed in the Study Area during the site visit (O).

6.3.3.4 Birds

More than 360 bird species inhabit the Azerbaijan territory. During migration and wintering periods, the importance of the shoreline and the wetland of the region is heightened due to the presence of a high number of migratory birds, in addition to the bird species present all year round.

The Study Area is located within the main migration route through the lowland, as shown by the broad red line within Figure 6-8. The autumn migration in Sangachal area and Absheron Peninsula starts in the second half of August and continues until mid-December, or until mid-January in case of severe winter conditions, with the peak migration period in November. The spring migration, headed to the north, north-west or north-east, starts in the second half of February and finishes in April, with a peak period during March. Generally, the bird breeding period spans from March to August, with the spring and fall migrations occurring March to April, and August to October, respectively. Over-wintering birds inhabit the coastline in great numbers from October to March.

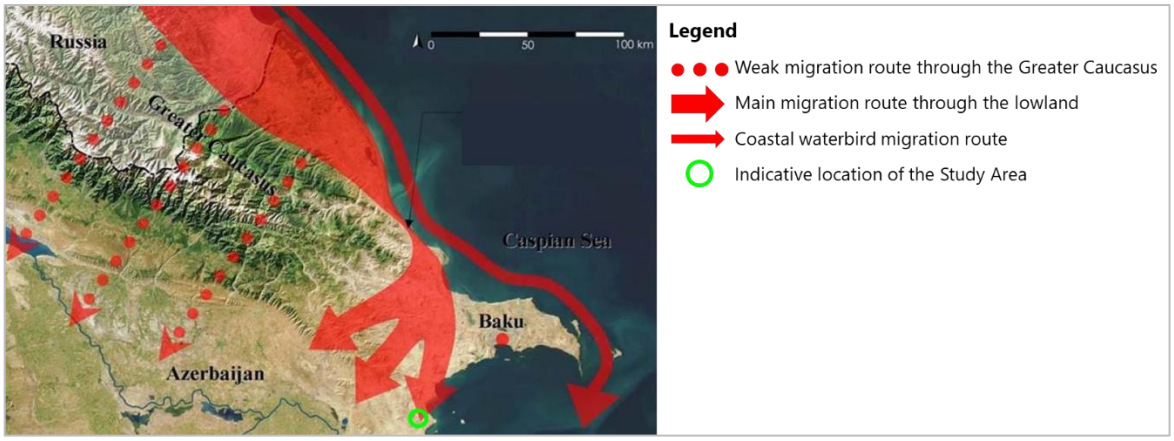


Figure 6-8: Important bird migration routes in autumn[29]

Birds are the largest number of vertebrates commonly inhabiting the Study Area. The high occurrence level of avifauna in the Study Area is mainly due to the importance that this zone has as migratory route and flyway, as well as to the presence of the IBAs located in the vicinity of the Project AoI (see Section 6.3.1). Connectivity to the IBAs is poor in terms of suitable habitat due to the poor-quality habitat (due to anthropogenic impacts) on site and surrounding the site. The IBAs are isolated form the proposed site in terms of habitat quality.

Generally, Crested Lark (*Galerida cristata*, LC) and Isabelline Wheatear (*Oenanthe isabellina*, LC) are the most numerous during summer nesting, while Eurasian Skylark (*Alauda arvensis*, LC), Common Starling (*Sturnus vulgaris*, LC) and Rook (*Corvus frugilegus*, LC) in winter. Common sparrow (*Passer domesticus*, LC) and Eurasian Blackbird (*Turdus merula*, LC) are permanent inhabitants of the area all year round. The bird fauna includes also the Common Kestrel (*Falco tinnunculus*, LC), Rock Dove (*Columba livia,* LC), European Turtle-dove (*Streptopelia turtur*, VU), Little Owl (*Athene noctua*, LC) and Crested Lark (*Galerida cristata*, LC). Isabelline Wheatear (*Oenanthe isabellina*, LC), Lesser Kestrel (*Falco naumanni*, LC), Olive Bee-eater (*Merops superciliosus*, LC), Eurasian Penduline-tit (*Remiz pendulinus*, LC), Red-backed Shrike (*Lanius collurio*, LC) and Lesser Grey Shrike (*Lanius minor*, LC) are common breeding species in summer.

[29] Coastal Bird Migration at the Caspian Shore of the Azerbaijan Republic in October 2007, Michael Heiss & Kai Gauger – 2011.

Based on the information collected through literature review, a total of 236 bird species has been identified as potentially present or passing through the Study Area. A broader list providing details on these bird species (i.e., family, order, protection/conservation status, behavior, etc.) is provided in Appendix D of this ESIA.

Of the species identified, 79% (corresponding to 186 birds) are known to exhibit migratory behavior in the area, out of which 92 are breeding migrants, 62 are present only during migrations (passage), and the remaining 32 are wintering migrants in the area. Approximately 43% of the listed species are congregatory, represented for the great majority by migrant water birds, while no endemic bird species were found or are expected to be present within the Study Area.

As reported in Table 6-9, out of the bird species potentially occurring in the Study Area with potential to utilize the habitat or airspace above the Project site, seven are threatened at global level according to IUCN standards (one is Critically endangered, two are Endangered, and four are Vulnerable), some of which are also included in the Red Data Book of Azerbaijan.

Table 6-9: Bird species potentially occurring at AoI which are threatened at global level according to IUCN standard and have potential to occur within the AoI

Species	Common Name	Conservation Status		Protection Status		Obs. / Liter.	Behaviour
		IUCN	Az. RDB	BERN	CITES		
Vanellus gregarius	Sociable Lapwing	CR	Yes	App. II	-	L	Migrant (passage)
Neophron percnopterus	Egyptian vulture	EN	No	App. II	-	L	Migrant (breeding)
Falco cherrug	Saker Falcon	EN	Yes	App. II	-	L	Migrant (wintering)
Streptopelia turtur	European Turtle-dove	VU	No	App. II	-	L	Migrant (breeding)
Aquila heliaca	Eastern Imperial Eagle	VU	No	App. II	App. I	L	Migrant (wintering)
Clanga clanga	Greater Spotted Eagle	VU	No	App. II	-	L	Migrant (wintering)
Otis tarda	Great Bustard	VU	Yes	App. II	App. II	L	Migrant (passage)

Notes:
- IUCN Threatening levels: "VU" = Vulnerable, "EN = Endangered, "CR" = Critically Endangered.
- "Az. RDB" means Red Data Book of Azerbaijan.

"Obs./ Liter." reports if species have been identified as potentially present in the Study Area through literature review (L), or species have been observed in the Study Area during the site visit (O).

6.3.4 Habitats and Ecosystem

The Study Area belongs to the semi-desert landscape type/ecosystems of the ecoregion known as "*PA1305 - Azerbaijan Shrub Desert and Steppe*". The main types of vegetation communities characteristic and naturally occurring in this landscape type/ecosystems are listed below (Map of Natural Vegetation of Europe, 2000):

- Wormwood deserts (*Artemisia lerchiana*) with ephemeroids (*Poa bulbosa*, *Catabrosella humilis*, etc.);
- Deserts *Salsola nodulosa* and *Salsola ericoides*;
- Halophytic deserts composed of *Salsola denroides*, both with ephemeroids and wormwood (*Artemisia lerchiana*); and
- Halophytic wormwood deserts (*Artemisia szowitziana*) with therophytes, such as *Petrosimonia*, *Climacopters*, *Salicornia*, and *Gamanthus* species.

Additionally, the Study Area is included in the lower reach of the freshwater ecoregions known as "*434-Kura - South Caspian Drainages*" and is part of the Absheron-Gobustan hydrogeologic district, characterized by a regional surface flow being less than 0.5 l/sec/km^2. This seasonal reavers are also known as wadi. The nearest main river is the Djeyrankechmez River, which enters the Caspian in the south-eastern part of the Study Area, and that is seasonal as occurring only after heavy rain.

The semi-natural habitat characterizing the AoI, mostly composed of semi-desert vegetation, is heavily degraded due to human activities (i.e., overgrazing, off-road driving, infrastructure development as pipelines, roads, and powerlines, military training purposes, etc.) and is extremely prone to erosion due to the existing semi-desert climatic conditions. Scattered vegetation and atmospheric precipitation provide for intensive weathering that can lead to the formation of badlands clay karsts that can be observed within and around the AoI.

The semi-desert vegetation occupies around 85% of the AoI. The main vegetation community recognized is the *Salsoletum* (Figure 6-9), dominated by saltwort species (*Salsola dendroides*, *Salsola ericoides*, *Salsola nodulosa*, *Suaeda microphylla*). These species are often accompanied by low-growing herbaceous forb species and grasses, including *Medicago minima*, *Medicago coerulea*, *Poa bulbosa*, *Bromus japonicus*, *Lolium rigidum*, *Eremopyrum orientale*, *Erodium cicutarium*.

Ephemeral surface streams, also called wadi, and wetlands extend for almost the 3% of the AoI (Figure 6-9). The streams and channels fed the coastal wetland areas during winter months forming an internal delta and may carry substantial volumes of water following intense rainfall events. In the depressions created by the seasonal streams the quantity of flora increases and includes tamarisk or salt cedar thickets (*Tamarix meyeri*, *Alhagi pseudoalhagi*, *Juncus acutus*, and *Salicornia europaea*). The riverine vegetation in the Study Area shows the effects of trampling from livestock, while the mentioned wetlands result to be quite modified by the anthropogenic activities occurring in the area and in particular by the presence of linear infrastructures that changes the local water flow and pose pollution risks. However, some reed beds still exist in the coastal areas, where the vegetation community is composed of *Phragmites australis* or *Typha latifolia*.

Semi-desert vegetation (*Salsoletum sp.*) dominated by woody saline species

Seasonal pond among semi-desert plants

Figure 6-9: Typical elements constituting the ecosystem characterizing the AoI.

Given the presence of wadis in the wider area, there is the potential for some connectivity to the coast in terms of hydrology with ephemeral wadis feeding into the coast during winter months.

According to IFC PS6, critical habitats are areas with high biodiversity value including:

- Habitats of significant importance to Critically Endangered and/or Endangered species (as listed on the IUCN Red List of Threatened Species).
- Habitats of significant importance to endemic and / or restricted-range species.
- Habitats supporting globally significant concentrations of migratory species and / or congregatory species.
- Highly threatened and / or unique ecosystems.
- Areas associated with key evolutionary processes.

EBRD PR 6 defines critical habitats as:

- Highly threatened or unique ecosystems.
- Habitats of significant importance to endangered or critically endangered species.

- Habitats of significant importance to endemic or geographically restricted species.
- Habitats supporting globally significant migratory or congregatory species.
- Areas associated with key evolutionary processes.
- Ecological functions that are vital to maintaining the viability of biodiversity features described above.

IFC PS 6 requires identification of Ecologically Appropriate Area of Analysis (EAAA) 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 (set out below). The boundaries of an EAAA are determined by 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. This approach ensures that all important biodiversity within the project footprint and linked surrounding habitats are taken into consideration.

There is a high degree of overlap between the different criteria used in PR6 and PS6. Based on the information collected through literature review and the site visit outcomes discussed in the previous sections, the presence of critical habitats within the Project's AoI has been assessed according to PS6 criteria (aligned with EBRD).

Specifically:

- Criterion 1 - Five Critically Endangered and/or Endangered bird species resulted to be potentially present within the AoI;
- Criterion 2 - No endemic and/or restricted-range species are expected to be present within the AoI.
- Criterion 3 - A total of n.186 migrant bird species and n.101 congregatory bird species, the great majority of which corresponds to migrant water birds, have been identified as potentially present in the AoI.
- Criterion 4 - No highly threatened or unique ecosystems have been identified within the AoI.
- Criterion 5 - No areas associated with key evolutionary process have been identified within the AoI.

ADB's Social Safeguard Policy (2009) defines Critical Habitat as:

"… a subset of both natural and modified habitat that deserves particular attention. Critical habitat includes areas with high biodiversity value, including habitat required for the survival of critically endangered or endangered species; areas having special significance for endemic or restricted-range species; sites that are critical for the survival of migratory species; areas supporting globally significant concentrations or numbers of individuals of congregatory species; areas with unique assemblages of species or that are associated with key evolutionary processes or provide key ecosystem services; and areas having biodiversity of significant social, economic, or cultural importance to local communities. Critical habitats include those areas either legally protected or officially proposed for protection, such as areas that meet the criteria of the Word Conservation Union classification, the Ramsar List of Wetlands of International Importance, and the United Nations Educational, Scientific, and Cultural Organization's world natural heritage sites."

Four criteria relating to the determination of Priority Biodiversity Features (PBF) are present within EBRD PR 6. These include:

1. Threatened Habitats (such as those under pressure by national, regional or international assessment including natural and priority habitats identified under Annex I of the EU Habitats Directive).
2. Vulnerable Species (such as those listed by IUCN or other national / regional lists). These include animal and plant species of community interest identified under EU Habitats Directive (Annex II).
3. Significant biodiversity features identified by stakeholders or governments (e.g. IBAs).
4. Ecological structure and functions that are vital to maintaining the viability of priority biodiversity features (such as locations essential for priority biodiversity features, riparian zones and rivers, dispersal or migration corridors, hydrological regimes, refuges or food sources, keystone of habitat-forming species).

It is important to note that the requirement for confirmed PBFs is to achieve No Net Loss (i.e. has different requirements of those features triggering Critical Habitat). There are no quantitative thresholds stated within the guidance for the determination of PBF and as such background data, field data and expert opinion are used to complete a qualitative assessment. Table 6-10 sets out the PBFs considered present in the Project AOI according to each criterion listed above.

Table 6-10: Priority Biodiversity Features in the AoI

PBF Criteria	Details within the AoI
Criterion 1 – Threatened Habitat	No habitat types or ecosystems were present or identified as being potentially present, that would be considered as priority habitats as such Criterion 1: Threatened Habitat has not been triggered.
Criterion 2 – Vulnerable Species	No vulnerable species have been identified within the Project AoI during survey effort. There is the potential for presence of seven bird species of vulnerable status and above. These include: Egyptian Vulture – IUCN EN (migrant breeding). Saker Falcon – IUCN / Az Red Data Book (RDB) EN (migrant wintering). Sociable Lapwing – IUCN / Az RDB – Cr (migrant passage). Eastern Imperial Eagle – IUCN VU (migrant wintering). European Turtle-Dove – IUCN VU (migrant breeding). Greater Spotted Eagle – IUCN VU (migrant wintering) Great Bustard. – IUCN / Az RDB – VU (migrant passage). There is also the potential for presence of Marbled Polecat IUCN / Az. RDB (VU), Common Tortoise (IUCN / Az RDB VU) and Schrieiber's Bent-Winged Bat (IUCN / Az RDB NT). These species therefore qualify as PBF under Criterion 2 on account of their conservation statuses.
Criterion 3 – Significant feature as identified by stakeholders or government	The Project site does not fall within any significant biodiversity features however the Gobustan Reserve IBA and KBA is around 1.5 km to the east-north-east of the Project site and extends over 5,000 ha. Within the IBA/KBA, only Common Tortoise is identified as Vulnerable. It is therefore considered that this species qualifies as a PBF.
Criterion 4 – Ecological structure and functions that are vital to maintaining the viability of PFB.	The Project AOI does not contain areas of structure or function vital for the maintenance of viable populations of PBF and as such Criterion 4 has not been triggered.

The presence of PBF in the AOI requires the Project to ensure there is no net loss to these species. The Project site itself is not considered to support PBF given its degraded condition and lack of identification during survey efforts.

The occurrence of Critically Endangered and/or Endangered bird species, as well as the occurrence of migratory and congregatory bird specimen, cannot be fully excluded in the AoI, especially considering the presence of wetlands and shoreline habitats located in the surroundings of the Project site (although not within the Project site itself). However, it is extremely unlikely that the AoI is of importance for the species' conservation given the following reasons:

- The existing disturbance associated to the presence of villages, farms, human settlements, industrial sites, and main transportation routes.
- The current level of degradation of the habitats, which result to be degraded and impacted by past anthropogenic activities (exploration and oil and gas extraction, diffuse waste dump, overgrazing, etc.).
- Limited extension of the wetland vegetation (stretching along the coast).

The Gobustan Reserve IBA and KBA lists only Common Tortoise as a species identified on IUCN / Az. RDB (VU). This species has not been found in the AOI during the two survey efforts in 2020 and 2021.

In terms of listed species potentially present:

- Sociable lapwing (CR) – the Project site habitat is not optimum for this species and is disturbed so it is unlikely to be present. The species has not been identified during the survey effort.
- Egyptian vulture (EN), Salker falcon (EN), Eastern European Eagle (VU), Greater Spotted Eagle (VU) and Great Bustard (VU) – the species could forage in the area however there are more suitable habitats away from the Project site and their use of the site is unlikely to be significant. There are no key feeding locations for Vultures such as livestock dumps noted within the Project site (although present in the wider area) and no suitable breeding habitat in the Project site exists. The species has not been identified during the survey effort.
- European Turtle-Dove (VU) – the species was not observed during the survey efforts and it is considered that there are more optimum habitats for this breeding migrant species than the Project site.
- Common Tortoise (VU) – the species is present in the wider area however it was not identified nor were there signs of its presence in the Project AOI during the survey efforts.
- Marbled Polecat (VU) – the species is largely restricted to areas with no anthropogenic impact and is not considered to utilize the Project site or AOI.

- Schreiber's Bent-Winged Bat (NT) – the species has not been found to be present in the Project AOI.

No Critically Endangered and / or Endangered flora or fauna were found to be present in the AoI during the survey effort. Habitat within the AoI is typical of the region and habitats on the Project site do not provide any key ecosystem services or key evolutionary processes. The Project site's relevance against the requirement to protect the area is highlighted by the diversity within the Gobustan Reserve compared to the degraded Project site. A lack of very important species (as well as less important species at a high level of presence) means that the area would not contribute if added to locally designated sites which are designed to areas with interesting habitats and species. The Project site is considered degraded and not of similar habitat quality to the Gobustan Reserve.

Degradation processes issues in the area as a result of intensive grazing of large and small horned animals have been continuously highlighted by stakeholders consulted during Project consultations. The area is mostly used as pasture for livestock.

6.3.5 OHL biodiversity baseline

6.3.5.1 Flora

The main types of vegetation in the zone adjacent to the study area are semidesert and desert plants, chal-meadow and water-marshy vegetation. In the far eastern part of the area, there are also some remains of riparian forests and shrubs. Extensive areas are used for agriculture, some of which are subject to irrigation, which is leading to salination.

The semi-desert and desert vegetation consists mainly of two most typical associations: Dendritic salt-wort – wormwood and Meadow-grass – wormwood. The Chal – Meadow areas are characterised by slightly salty soil related to periodic flooding. Mesophytes and mesoxerophytes occupy significant place within the species composition of chal-meadow vegetation. They are mainly found in the depressions with the high level of ground water, on loose alluvial soils. Camel thorn Alhagi pseudoalhagi, which occasionally forms mixed associations with the salt-wort Salsola dendroides and shorewort grass Aeluropus repens are key chal-meadow plants growing along the streamway of Kur.

Remains of riparian forests or groups of trees on the river aluvium are alternated with shrubs, often with dominating tamarisk (Tamarix ramosissima) and areas with secondary chal-meadow plants. The forest has been heavily cut down and damaged by grazing. In addition, due to recession of the water level, trees in tugai forests along the shores of Kura River are disappearing.

The foothills part of the study area is mainly covered by semidesert ecosystems. The diversity and phytomass of plant species are very scarce, the nature of the vegetation changes depending on the availability of water and its salinity. Ephemerals grow well at young age. Semi-desert vegetation covers a large area of the OHL. A relatively large number of ephemerals (plants adapted to living on saline soils (dry steppes, deserts, seacoasts, etc.)) are widespread in their natural form. This is due to the fact that the species composition of plant communities in the OHL area was formed under conditions of deficiency of moisture and mineral nutrition elements, high temperatures and excessive insolation. Saline soils are commonly encountered. The dominant type of vegetation on the site is steppe plants. In the composition of the vegetation cover, the genus of plants of the Amaranth family play the dominant role, prominent representative of which is *Salsola nodulosa* (saltwort). This species, within its geographic range, is a part of various natural complexes and phytosenoses of the Absheron Peninsula and Gobustan.

Vegetation in the AoI can be divided into two groups:

- Shrubs and halophytes growing in semi-desert areas of a significant part of the project area.
- Vegetation cover growing in flooded areas, ephemers, coastal plants growing on sand or in shallow lagoons.

The study area is characterized by two floristic groups – desert flora (desert ephemerals) and steppe flora.

6.3.5.2 Fauna

Due to the lack of development within the OHL area, it can be assumed that there may be habitat for some rodents and a number of reptiles. This is evidenced by the numerous burrows of rodents found during the visual inspection of the site.

Fauna diversity is relatively poorly developed in semi-desert environment. Visually encountered species include hares (*Lepus*), foxes (*Vulpes vulpes*), some rodents, a number of reptiles represented by snakes (*Vipera Libertina*) and lizards, and several bird species.

Common mammals in the OHL area include jackals (*Canis aureus*) and wolves (*Canis lipus*), which follow flocks of sheep to their wintering areas, and the red fox (*Vulpes vulpes*), which is one of the permanent inhabitants of the area. Other typical mammals include the hedgehog (*Hemiehinus auritus*), the hare (*Lepus europaeus*), and several house mouse species (*Mus muscus, Meriones erythrourus, and Microfus socialis*).

Bird species include summer nesting, *Galerida cristata* and *Oenanthe isabellina* are the most numerous, *Alauda arvensis*, *Sturnus vulgaris* and *Corvus frugilegus* in winter. House sparrow – *Passer domesticus* and blackbird – *Turdus merula* live here all year round.

Further species present include the common kestrel (*Falco tinnunculus*), pigeons (*Columba livia*), Turtle dove (*Streptopelia turtur*), horned owls (*Athene noctua*), partridges (*Galerida cristata*), and isabelline wheatear (*Oennanthe isabellina*). *Oennanthe isabellina*, *Falconaumanni* and *Merops superciliosus*, *Remiz pendulinus*, *Lanius collurio* and *Lanius minor* and many other birds live in the area and breed in summer.

6.4 Assessment of Effects

This section presents the identification and assessment of the potential impacts generated by the Project on biodiversity during the construction, operation and decommissioning phases. The following sub-sections assess these impacts in relation to the identified ecological and biodiversity receptors and provide associated relevant mitigation measures aimed at minimizing Project generated effects.

As explained in Section 6.3.1, given the location of the Project site and its characteristics, it is not likely that there would be any significant direct or indirect impacts of Project activities anticipated on National Protected Areas. The Project site does not appear to be functionally linked to the protected areas.

6.4.1 Receptors' Sensitivity

6.4.1.1 Terrestrial habitat and flora

The information in this section is based on the 2020 and 2021 survey effort in addition to the literature review. The studied area belongs to the semi-desert landscape type/ecosystems of the "*PA1305 – Azerbaijan Shrub Desert and Steppe*" ecoregion. The habitats within the AoI are mostly formed of ephemerals (semidesert plant communities, such as bushes wormwood and saltwort species), shrubs and halophytes (characteristic of steppe flora), and open spaces with little or no vegetation.

Ephemeral surface streams and wetlands extend for only the 3% of the AoI. The wetlands located along the coastline approx. 5 km east away from the Project Site is known to show seasonal changes. The ponds and streams (riverine areas) potentially occurring in the AoI are temporary as strictly associated to heavy rainfall events and do not appear to support extensive biodiversity. Considering that these habitats are outside of the proposed Project footprint and will be left undisturbed, no impacts are anticipated on these types of habitats due to Project activities. Furthermore, no impacts are likely in relation the hydrological connectivity of these areas.

The sensitivity of the studied semi-natural habitat is considered to be "Low" because this habitat is degraded due to human activities (i.e., overgrazing, off-road driving, infrastructure development, etc.), is extremely prone to erosion associated to the existing semi-desert climatic conditions and is widespread nationally and locally. In addition, no critical habitats have been identified within the AoI.

No IUCN or Azerbaijan Red Book threatened plant species were found within the AoI during the survey effort in 2020 and 2021. Neither endemic nor invasive flora species were observed during the surveys. Therefore, the flora species' sensitivity values are determined as "Low".

6.4.1.2 Terrestrial Fauna

Possible occurrence of 38 mammal species (none of which based on direct observation) was determined in the AoI. Amongst these, Marbled polecat (*Vormela peregusna*) is considered as a species of concern due to its IUCN Red List status (VU) and to the fact that, together with the Schreiber's Bent-winged bat (*Miniopterus schreibersii*), is included in the Az. RDB. In addition, a total of five mammals species results to be listed in Appendix II or in Appendix III of the Bern Convention. All other mammal species identified as potentially present in the AoI are of low conservation value. Based on these considerations, the overall mammal species' sensitivity values are determined as "Moderate".

A total of 18 reptile species and four amphibian species are potentially present within the AoI. Out of these, only a snake (possibly Schmidt's whip snake (*Dolichophis schmidti*, LC) and a dead individual of European pond turtle (*Emys orbicularis*, NT) have been observed during the surveys. All the species identified as potentially present in the AoI are of low conservation, except for Common tortoise (*Testudo graeca*) which is considered Vulnerable according to IUCN standard. Also, Common tortoise and European tree frog (*Hyla arborea*) are the only species listed in the Red Data Book of Azerbaijan. Considering that the occurrence of amphibian species is strictly connected to the presence of wet areas and wetland vegetation, which are temporary and constitute only 3% of the AoI habitat, and that only a threatened species of reptiles has been identified as potentially present in the AoI, the overall amphibian and reptile sensitivity values are determined as "Moderate".

6.4.1.3 Avifauna

The AoI is located within a main avifauna migration route through the lowland and a total of 236 bird species has been identified as potentially present or passing within the area, some of which have been also directly observed during the surveys. Out of these avifauna species, 79% are migrants and 43% are congregatory species. Of the bird species potentially occurring in the Study Area with potential to utilize the habitat or airspace above the Project site, seven are threatened at global level according to IUCN standards (one is Critically endangered, two are Endangered, and four are Vulnerable), some of which are also included in the Az. RDB. These species are also considered PBF. Based on these considerations and considering that birds are the largest number of vertebrates commonly inhabiting the wider Study Area, which also includes part of an IBA, the overall avifauna sensitivity is determined as "Moderate".

6.4.2 Impact Significance

6.4.2.1 Construction

The activities anticipated during the construction phase will include earthworks, excavations, grading, site levelling, asphalting, paving and the operation of construction machinery and equipment. Potential impacts from construction activities may include:

- Terrestrial habitat and flora loss and degradation (permanent and temporary);
- Disturbance to terrestrial animal species due to Construction operations' (i.e. generated noise, artificial light, dust, etc.).
- Injury or mortality of faunal species.

- Accidental introduction and dispersal of invasive species from construction activities.
- Indirect impacts.

Impacts on Terrestrial Habitat and Flora

The most significant direct impact of the land preparation and construction phase of the Project would be habitat loss or degradation for terrestrial flora species, which would result in loss of flora species' populations, along with their important ecological function for fauna. In addition, the disturbance to the soil layer and change of land use leaves the Project site vulnerable to the establishment of invasive or exotic species as well as native encroacher species. The potential establishment of invasive species need to be monitored and should their numbers proliferate, measures to control this must be implemented.

Measures to control the species will depend on the species noted and best international practice for this species removal. Cutting and removal of individuals will be in preference to poisoning of saplings which will only be used when this is the most appropriate possible control measure.

Indirect impacts on habitats and flora are expected to include the risk of hydrocarbon pollution through potential spillage associated with the use of machinery and vehicles, resulting in toxic hazards to flora, as well as dust production from the use of heavy machinery that might cause ecological problems to flora. These risks, as not directly impacting species' populations and habitats, could be avoided when mitigated in line with environmental management plans.

The extent of the mentioned potential impacts would be restricted because construction activities will be limited to the Project Site and Qobustan Access Road, where a minimum clearing of natural vegetation will be ensured (limited to the roads and building footprints where not possible to avoid). Construction operations will be temporary and some minor impacts of limited extent and easy to recover through natural regeneration might be expected.

Based on these considerations, the impact magnitude is considered to be "Low to Moderate" for terrestrial habitat and flora species, as areas of shrubs and steppes that will be affected permanently and temporarily will be limited and the overall integrity of the habitats is anticipated to remain.

Considering that receptors' Sensitivity is "Low", and the potential impact Magnitude is expected to be "Low to Moderate" for both terrestrial habitat and flora species, it can be concluded that the overall Significance of impacts potentially generated by construction activities on these receptors is "**Minor to Moderate**".

Impacts on Terrestrial Fauna

Mammals, Amphibians and Reptiles are likely to be affected by construction through habitat loss/degradation, causing potential loss of breeding sites and nests, disturbance (presence of people, artificial lighting, dust and noise), injury or mortality due to construction work, increased traffic and temporary habitat fragmentation. Bush clearing and construction activity within the Project's footprint will alter or destroy local faunal habitats, impacting species that rely on those habitats. Animals that have home ranges which exceed the footprint of the construction works are likely to vacate the area, while small, less mobile animals, or animals with burrows or nests in the area may not be able to vacate the area and if encountered need to be relocated by relevant personnel.

The presence of excavated areas during the construction phase can potentially be harmful to wildlife as well as livestock in the area; there is a risk of animals falling into excavated areas and being injured, trapped or killed. In addition, vehicles will use access roads, and existing tracks to access the site, that may be utilized and frequented by game and livestock. The risk of vehicle collisions poses a threat to both drivers, passengers, bystanders and animals. These risks, as not directly impacting species' populations and habitats, could be avoided when mitigated in line with environmental management plans.

Due to the nature of the proposed construction works, this is not likely to have significant impacts on the terrestrial fauna populations as a whole, as their diversity within the proposed Project site resulted to be particularly low. Construction activities will be limited to the Project Site, and the associated impacts will be therefore confined to the AoI. The habitats affected by the construction are common at the national and local level and the areas affected directly are relatively small. Although not noted during the survey effort, there is the potential for tortoises to be present in the area. Direct impacts to these species could occur (if present) during construction activities including killing or injuring, disturbance and direct habitat loss from construction. Fencing could restrict movement unless species are allowed to pass through the Project site.

The magnitude of impact is therefore predicted to be Low, as terrestrial fauna species identified as potentially inhabiting the Study Area are those that are found in the larger area, with alternative habitats outside the AoI.

Considering that the Receptors' Sensitivity is of "Moderate" level and the impact Magnitude is expected to be "Low", the overall impact Significance is estimated to be "**Minor to Moderate**".

Impacts on Avifauna

Bird species are likely to be affected by loss/degradation/fragmentation of breeding and feeding habitat potentially resulting from removal of vegetation and surface grading across the Project site area, as well as by disturbance associated to construction activities (i.e., presence of people, artificial lighting, dust, noise, and liquid/solid waste). These species are considered to have high sensitivity value due to their conservation values as per IUCN Red List and Red Data Book of Azerbaijan for conservation values of these species.

The habitats affected by the construction are common at the national and local level and the areas affected directly are relatively small as construction impacts will be confined to Project Site. The Project site is not a critical nesting/breeding ground for Critically Endangered or Endangered avifauna species and Project construction phase will be temporary with regards to disturbance effects. Therefore, construction activities are not expected to lead to a net loss or reduction in the global or national/regional population of any species and it is likely that any potential impact on these species would be tolerated by the local population.

Considering that the Receptors' Sensitivity is of "High" level and the impact Magnitude is expected to be "Low", the overall impact Significance due to potential habitat loss would be "**Minor to Moderate**" in Significance.

6.4.2.2 Operation

The Project operation phase will require routine maintenance activities throughout the Solar PV Plant operation phase to ensure extended system lifetime, including regular cleaning of panels and maintenance of electrical components, control equipment and access roads.

Impacts on Terrestrial Habitat and Flora

There will be no further temporary habitat loss during the operational phase of the Project. The vegetation will be cleared during construction phase for the footprint of internal roads and buildings, causing a permanent impact related to the loss of vegetation throughout the Project Site.

Shadow effects caused by the presence of solar panels can also alter the species composition and diversity of underlying habitats as a result of air and soil microclimate variation[30]. Furthermore, the partial membrane (if implemented) would partially remove the possibility of vegetation growing under the panels.

However, considering that the areas directly affected by the Project are relatively small, the Magnitude of potential impacts generated on terrestrial habitat and flora during the operation phase is considered to be "Minor".

Given the above considerations and considering that Receptors' Sensitivity is estimated to be "Low", the Significance of impacts potentially generated on terrestrial habitat and flora during the Operation phase is estimated to be "**Not Significant**".

Impacts on Terrestrial Fauna

Mammals, Amphibians and Reptiles are likely to be affected by operation through habitat loss/degradation (potentially occurred during the construction phase), increased disturbance, and injury or mortality due to potential conflicts between workers and fauna.

The increased disturbance due to presence of people, artificial lighting, noise and dust will be relatively insignificant during operation compared the construction phase, as well as vehicle movements will be reduced and therefore injury /mortality risks will be lower. The Magnitude of impacts potentially induced on terrestrial fauna during operation is therefore anticipated to be "Negligible".

Given the above considerations and considering that Receptors' Sensitivity is estimated to be "Moderate", the Significance of impacts potentially generated on terrestrial fauna during the Operation phase is estimated to be "**Low**".

There is the potential that the geotextile / white DPE layer used to partially cover the ground (immediately under the PV panels) could create small enhancements for certain fauna. It is considered possible that the ground layer could provide coverage for lizards on the Project site for predator avoidance with potential Negligible to Low benefits achievable.

[30] Mitigating biodiversity impacts associated with solar and wind energy development – Guidelines for project developers – IUCN, 2021.

Impacts on Avifauna

Once the PV Panels are installed, the site appearance from the air will be altered significantly.

Like glass or reflective surfaces on buildings, PV panels could present a collision risk to bird species, especially if the surfaces are vertically oriented and/or reflecting light. The extent and significance of these impacts are largely unknown and limited to a small number of studies[30].

Large areas of PV panels and their associated facilities can also disrupt wildlife movement and/or migrations by acting as a barrier. Although direct evidence of the barrier effect of solar facilities is largely unquantified, the barrier effects related to large scale developments and infrastructure components, such as fencing, has been demonstrated to impact species movement, and reduction of range size[30].

Additionally, the polarized light reflected from solar panels can confuse flying birds and cause them to perceive the solar array as a water body. This phenomenon, known as the "lake effect", may cause potential disorientation of birds from dense arrays of panels resembling water bodies and therefore potential for injury and collision mortality[30,31]. This is potential concern considering the number of waterbirds that inhabit the greater region.

To date, there is little evidence to support the existence of the suggested "lake effect", where birds mistake PV panels for water bodies. Limited number of scientific papers in the peer-reviewed literature present fatality information from fatality monitoring studies at a photovoltaic utility-scale solar energy facility; however, more data exists in unpublished reports.

Birdlife disputes the significance of the "lake effect" when considering PV installations as the amount of reflected light is not considered to be high enough to affect flying birds and there is no scientific evidence of fatality risks to birds associated with solar PV arrays[32]. PV panels inevitably present some risk of collision mortality to birds as likely as collision with any fixed object or man-made structure, such as fences, towers or buildings[33], but

[31] Polarized Light Pollution: A New Kind of Ecological Photopollution - Gabor Horváth, György Kriska, Péter Malik, and Bruce Robertson, 2009.

[32] Meeting Europe's Renewable Energy Targets in Harmony with Nature - A BirdLife Europe Report (http://ww2.rspb.org.uk/Images/Renewable_energy_report_tcm9-297887.pdf).

[33] Collision Effects of Wind-power Generators and Other Obstacles on Birds – Drewitt and Langston, 2008.

there is no firm evidence of large numbers of bird strikes associated with PV panels.

It is very unlikely that the presence of solar panels would result in a significant increased risk of collision. Furthermore, as the areas directly affected by the Project are relatively small, no impact in terms of population decrease is expected as a result of collision, displacement or barrier effect. Thus, potential negative impacts on avifauna species associated with PV panels glare and resembling water bodies are considered to be of "Low" Magnitude. However, it is recommended to monitor bird fatalities and panel appearance at the Project Site during operations.

Given the above considerations and considering that Receptors' Sensitivity is estimated to be "Moderate", the Significance of impacts potentially generated on avifauna during the Operation phase is estimated to be "**Minor to Moderate**".

6.4.2.3 Decommissioning

The activities associated with decommissioning will involve dismantling of the solar power plant and removal of its facilities or upgrading of the solar power plant by replacing the old PV modules to increase the total peak power of the plant. The project is not expected to be decommissioned at least for 23 years.

This is a temporary phase that could result in some additional noise and dust disturbances. The magnitude of the potentially induced effects will depend on how much of the infrastructure is removed or repowered.

Generally, decommissioning is expected to have a "**Low to Moderate" or "Moderate**" adverse impact significance on the ecological features within the Project AoI, given similar factors highlighted during construction in section 6.4.2.1. Once fully decommissioned and the habitats recovered from disturbance, the long-term impact significance is likely to be "**Moderate**" positive following the reinstatement of native vegetation and colonisation by fauna species.

6.5 Mitigation

Biodiversity-related commitments and mitigation and management actions will be captured in the Construction Environmental Management Plan (CEMP) and Operational EMP (OEMP) as applicable.

6.5.1 Pre-Construction / Site Clearance

The first stage of mitigation will ensure that the Project site is prepared in such a way as to discourage animals from using the Project site. Initial site preparation and clearance could result in the loss of nesting birds and any other breeding species and where possible the initial preparatory work will be undertaken during the non-breeding season. The aim of this work is making the areas of roads and hardstanding unsuitable for species (e.g. ground nesting birds), minimising the likelihood of impact.

A pre-construction survey will be completed for works undertaken in the breeding season to check for animals (reptiles and active bird nests) and, if found, construction activities are programmed to avoid such features until they have been moved or there is a natural cessation of breeding effort. The pre-construction survey will also include a re-check for plant species of conservation concern. In the unlikely event that species listed at IUCN Endangered or above are noted then works will cease until a plan to protect these species has been agreed. This will firstly look to use micro-siting and protective fencing during works to avoid any interference. Where this is not possible, translocation of individual plants to suitable habitat or seed gathering of other plants of the same species and sowing in the area (depending on which is most suitable for the species) will take place. In this scenario, monitoring of the species within the entire area will take place (including full re-survey of the site to look for other individuals of this species) critical habitat will need to be revisited and methods to protect the species, and enhance its population as appropriate, agreed with lenders.

Although no tortoises were found in the Project site, there is the potential for the species to be present and therefore a pre-construction check will be undertaken and, if found to be present, the construction timetable will be designed so that excavation work will be focused around avoiding the most sensitive times (i.e. mid-October to March (or sooner if conditions allow) when tortoises may be hibernating below ground) as well as June and July during aestivation (unless the recent survey data confirms no presence of protected species or there are exceptional circumstances).

Any areas outside of the footprint of the Project, that are cleared as a result of construction activities (storage areas etc.) will be rehabilitated following the completion of construction phase.

Potential invasive flora species will be identified and action must be taken to clear these species if they occur in or around areas designated for bush clearance to prevent establishment after clearing.

6.5.2 Construction

Mitigation during construction phase includes the following measures:

- To avoid contamination, hydrocarbons will be stored in a secured bunds to be located on impermeable surfaces with controlled drainage away from natural water courses. Bunds will be sufficient to contain 110% of the volume of liquids to be stored within. They will also be fully contained to stop contamination of rainwater run-off. In addition, refuelling of vehicles and machinery will only occur in designated areas.
- All hazardous materials must be correctly stored to limit chances of contamination of the area. Generally, it would be advisable to use biodegradable hydraulic oils, where possible.
- Wetland areas and riverine systems outside of the Project site will be left undisturbed during construction.
- Project staff require environmental toolbox talks during construction to raise awareness, limit conflict and reduce additional disturbance to terrestrial fauna and avifauna.
- Staff will be briefed on risks of exposure to fauna inhabiting the area as well as on preventive measures to be undertaken. Workers in the field will wear protective clothing: long trousers, closed shoes, and leather gloves. Information regarding nearest location of treatment for any bites and stings should be made available.
- Any snakes encountered at the site must not be handled or harmed by Project workers. Animals must be relocated by appointed personnel.
- Any fauna (not including nests) directly threatened by construction activities will be relocated by relevant personnel.
- The collection, harvesting or hunting of any plants or animals must be strictly prohibited. A 'no tolerance' policy must be adopted with respect to construction and operations workers. Any culprits guilty of poaching must be apprehended.
- Fires must be controlled and only allowed in fire permitted areas. Staff training must be carried out in relation to fire safety and firefighting equipment such as fire extinguishers and sand buckets available at every site.
- A policy whereby the animals have "right of way" during construction would reduce incidents of conflict.
- Should any animals get trapped or be harmed in anyway, the relevant personnel must be informed.
- Access roads and substation sites require suitable drainage systems.

- Cleared areas no longer required for construction activities will be rehabilitated by reseeding with locally found grasses (where appropriate) and shrubs increase soil stability.
- Construction vehicles must remain on the access roads and not drive in the un-cleared bush.
- Checks must be conducted upon construction completion, any areas showing signs of erosion will be immediately repaired.
- Any excavated areas must be temporarily demarcated and fenced off to bar access to animals; following the construction phase, those areas need to be re-filled and rehabilitated. Where not possible, tapered sides or a ramp must be in place to allow animals out and checks undertaken prior to filling in.
- Vehicle speed limits must be imposed and adhered to, with the aim of reducing vehicles' dust production and potential for collision with local biodiversity.
- Areas where excessive dust is produced will be watered periodically to reduce the amount of dust being thrown up in the air.
- Heavy construction machinery will be fitted with mufflers to reduce noise.
- Drivers operating in the area must be well briefed and must be aware of the dangers that vehicles pose to the local fauna.
- Fencing around the Project site will be designed to allow small mammals and fauna to pass safely underneath the area.

These measures will be detailed within the CEMP, Emergency Preparedness and Response Plan (EPRP), Traffic and Transportation Management Plan (TTMP) and Hazardous Substances and Waste Management Plan as appropriate.

6.5.3 Operation

Operational mitigation measures are set out below:

- During routine maintenance any invasive flora species will be removed. Cutting is an effective control measure. Measures will be included within the OEMP to ensure that a set protocol is followed to avoid the risk of spread to other areas.
- Fencing around the Project site will be designed to allow small mammals and fauna to pass safely underneath the area during operations.

- OHL markers are proposed on the sections of line closest to the Project and will be discussed with Azerenergi. These would have the earth wire with 1 lit diverter at every 10m and marking conductors with a 1 lit diverter at 15 m in a staggered way, such that the OHL as a whole has at least one diverter every 5 to 6 m (Wildlife Institute of India 2018 Power-Line Mitigation Measures. Second edition (2020).
- Any potential bird collisions with the solar panels will be monitored and noted. A bird protection plan will be produced that will provide the protocol for monitoring (which will be standardised, to best international practice and appropriate for detailed analysis of data) will be adaptive so that it can react to changes in noted collisions.

This mitigation will be included within an Operational EMP.

6.5.4 Decommissioning

During the decommissioning phase, it is imperative that work crews properly dispose of any waste materials associated with the PV plant dismantling or upgrading operations. All waste materials must be managed and transported in the correct manner to reduce any risk of habitat contamination. In general, mitigation measures set out for the construction phase will be applicable.

A Decommissioning and Site Restoration Plan will be developed prior to the decommissioning phase.

6.6 Residual Effects and Conclusions

The areas of sensitivity and the expected potential impacts associated with flora and fauna do require some management and mitigation. With the implementation of the mitigation strategies outlined in Section 6.5, it is likely that there will be no long-term residual impacts on local habitats and native fauna and flora and all the expected impacts potentially arising from the Project development will be minimized to “Low” level at least.

7 Hydrology and Hydrogeology

7.1 Introduction

The following chapter deals with the main aspects relating to the hydrological and hydrogeological baseline conditions and assessment of any potential impacts resulting from the construction, operation and decommissioning of the Project on the water environment including surface water and groundwater conditions.

7.2 Assessment Methodology

Baseline data has been collected to inform the assessment process through desk-based studies and field visits in July 2020 by ARPA Consulting in a consortium with Mercados-Aries International. Primary water sources were identified using existing topographical maps, drainage maps, and aerial photos. In addition, a Hydrology and Flood Risk[34] assessment was performed by Wood in February 2021. The assessment of potential impacts has been undertaken in accordance with the criteria outlined in Chapter 4.

7.3 Baseline Conditions

7.3.1 Topography

Denudation and accumulation processes have played an important role in the formation of the geomorphological structure of this territory. During the Neotectonic period, these processes became more intensive, and the topography of the area was subjected to strong weathering, owing to which the eminences were formed (including the 300-400 m high “mountains” of mud volcanoes), hills, valleys and ravines. In many cases, the tectonic structure of the terrain corresponds to its geomorphological elements.

Beyond the project site, especially in the coastal block, plateau and flat landforms related to the accumulative-denudation type prevail. 7-10 km wide abrasive-accumulative plain extends along the Caspian Sea. In terms of geological age, this plain was formed in the Quaternary period.

[34] Masdar Area 60 Solar Hydrology Study - Baseline Hydrology and Flood Risk Appraisal. Wood Group UK Limited – February 2021

In the north and south of this plain, in a relatively small area, the relief has the shape of a plateau. There are low hills and foothill types of relief in the central part. Mud uplands and coverings of the Pliocene-Quaternary period are widespread here. This type of relief in the form of a narrow strip extends to the west. Some parts of the coastal block, especially the eastern slopes of hills and highlands, have an escarp shape, i.e. the relief has a more or less steep stepped shape. As shown in figures below, the site is predominantly covered by sparse herbaceous vegetation and crossed by numerous unpaved footpaths and tracks.

Figure 7-1: Landforms of the project site in different directions

Figure 7-2: Herbaceous vegetation in the study area

The site spans a catchment divide, with the northern portion and majority of the site sloping north, whilst the southern portion slopes to the south-east. The gradient of the slope across most of the site is shallow, with the vast majority of land having a slope of less than 3°. Steeper sloped regions are observed in the entrenched drainage channels that drain northwards, with localised slope angles of up to 21°. According to the topographic plan, the elevation values of the area ranges from a minimum of 60°m AMSL (Above Mean Sea Level) to a maximum of 149.0 AMSL.

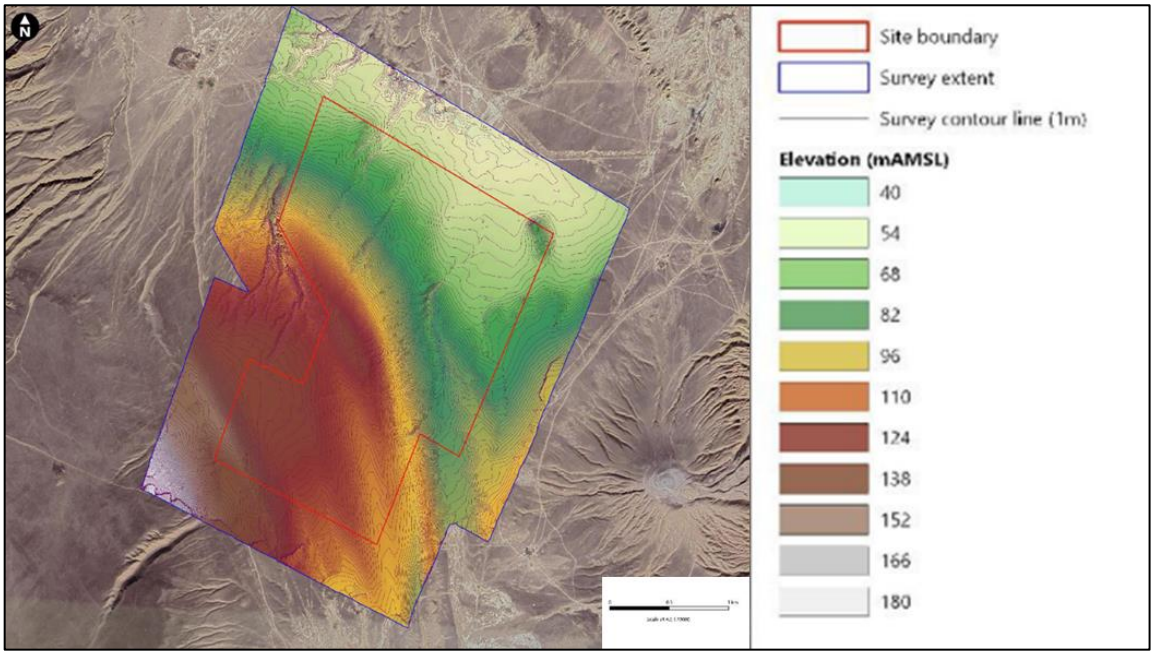


Figure 7-3: Topography and elevation[34]

7.3.2 Hydrology – Surface water

According to the topography, satellite images and the site visit performed in July 2020 there are no perennial watercourses within the Project site. Several ephemeral watercourses have been identified in the northern portion of the site flowing in a northerly direction towards Qobustan town. The most significant drainage channel originates to the south-east of the site boundary and captures run-off from the adjacent mud volcano situated 1.5 km East of the site boundary.

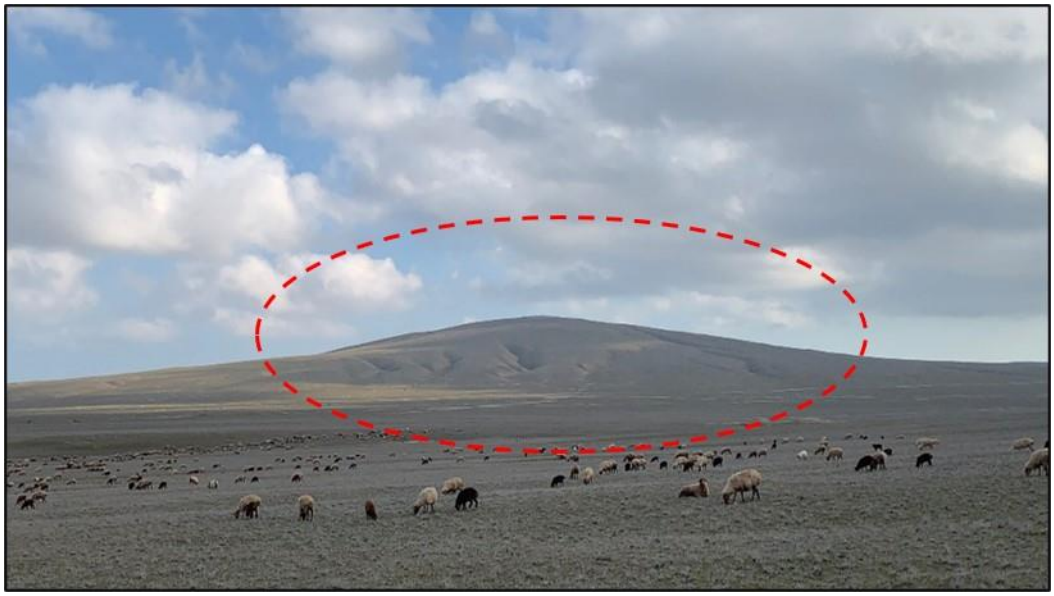


Figure 7-4: South-east drainage channels (circled in red)

7.3.3 Flood risk

The potential flood risk has been assessed by implementing a GIS-based model to perform data analysis (developed by Wood). Catchment and drainage analysis confirmed the location of the ephemeral watercourses identified from the aerial imagery analysis draining in a northerly direction across the Project site. The extent of the contributing catchments and drainage pathways is shown in Figure 7-5.

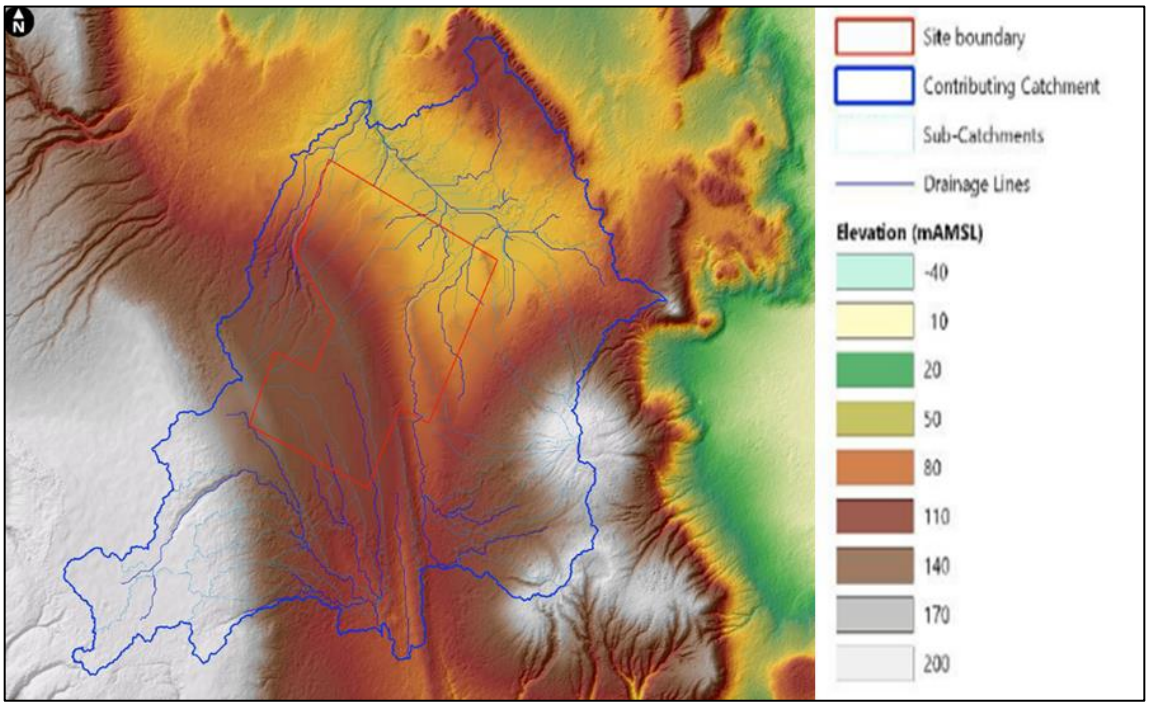


Figure 7-5: Catchment and drainage analysis[34]

The approximate Project site location corresponds to an arid and desert environment (Figure 7-6). The central portion of the country in the Kur-Araz lowland between the Greater and Lesser Caucasus is largely cold and arid, with mean annual precipitation of less than 200 mm. The Greater and Lesser Caucasus bounding the country to the north and south have temperate and sub-tropical climates on the foothills and plains. The greatest annual precipitation is observed in these regions, with mean annual rates of up to 1600mm and greater.

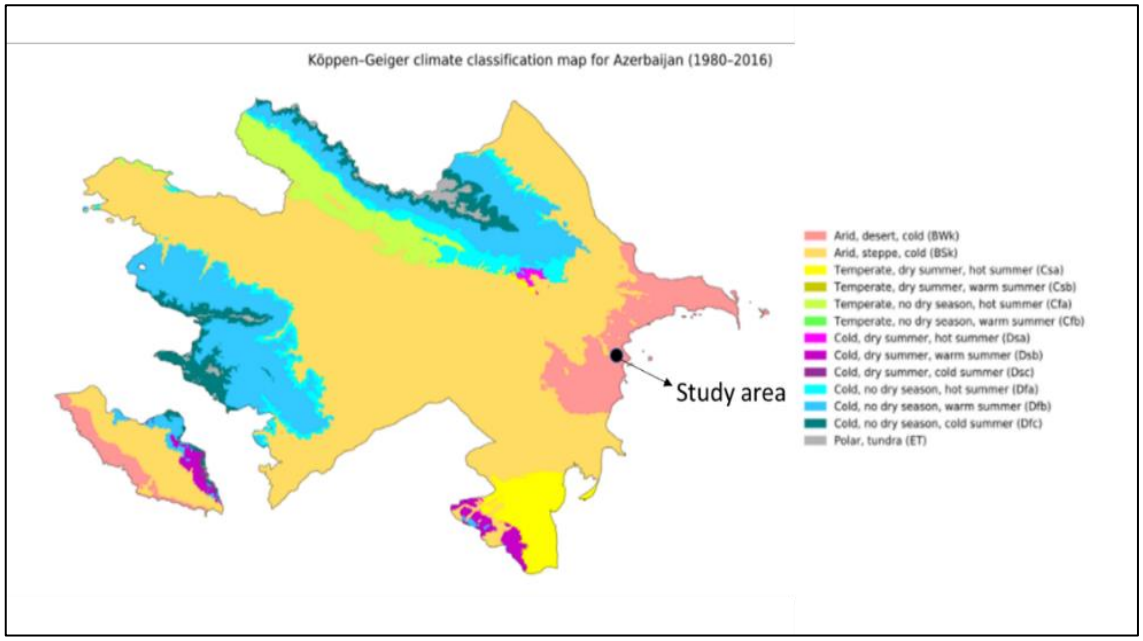


Figure 7-6: Azerbaijan Koppen-Geiger classification[35]

There are no permanent watercourses within the Project site boundary. The analysis of the topography and underlying geology suggest that the risk of groundwater flooding is low. There is no evidence from photographs of the Project site, nor from aerial photography of any significant artificial sources of flood risk. Whilst the Project site survey data and analysis of satellite imagery has identified several ponds made from earthen dike near the farms surrounding the Project site, where water is collected for animals watering purposes, these are not considered to pose a significant risk to the Project in the event of a failure given their relative size.

[35] Present and future Köppen-Geiger climate classification maps at 1-km resolution, Hylke E. Beck et al. 10.1038/sdata.2018.214

As such, the only significant source of flood risk to the Project site is considered to be pluvial, from runoff arising from extreme rainfall. This is evidenced by the ephemeral channels draining to the north in the northern and eastern portions of the site evident from aerial photography.

A range of scenarios of differing probabilities of occurrence were selected for assessment through the hydraulic model[34]. These consist of the following Annual Exceedance Probability (AEP) storm events:

- 1 in 10 years (10% AEP).
- 1 in 25 years (4% AEP).
- 1 in 50 years (2% AEP).
- 1 in 100 years (1% AEP).

The modelling outputs have demonstrated that the majority of the Project site is typically at low risk of flooding, with predominantly shallow (<0.15 m) peak flood depths. The greatest flood risk, both in terms of depth and velocity, is anticipated within the entrenched drainage channels that drain the Project site area flowing north and south-east, whilst an extensive region of shallow water flooding is anticipated in the north-east portion of the Project site across all AEP flood events.

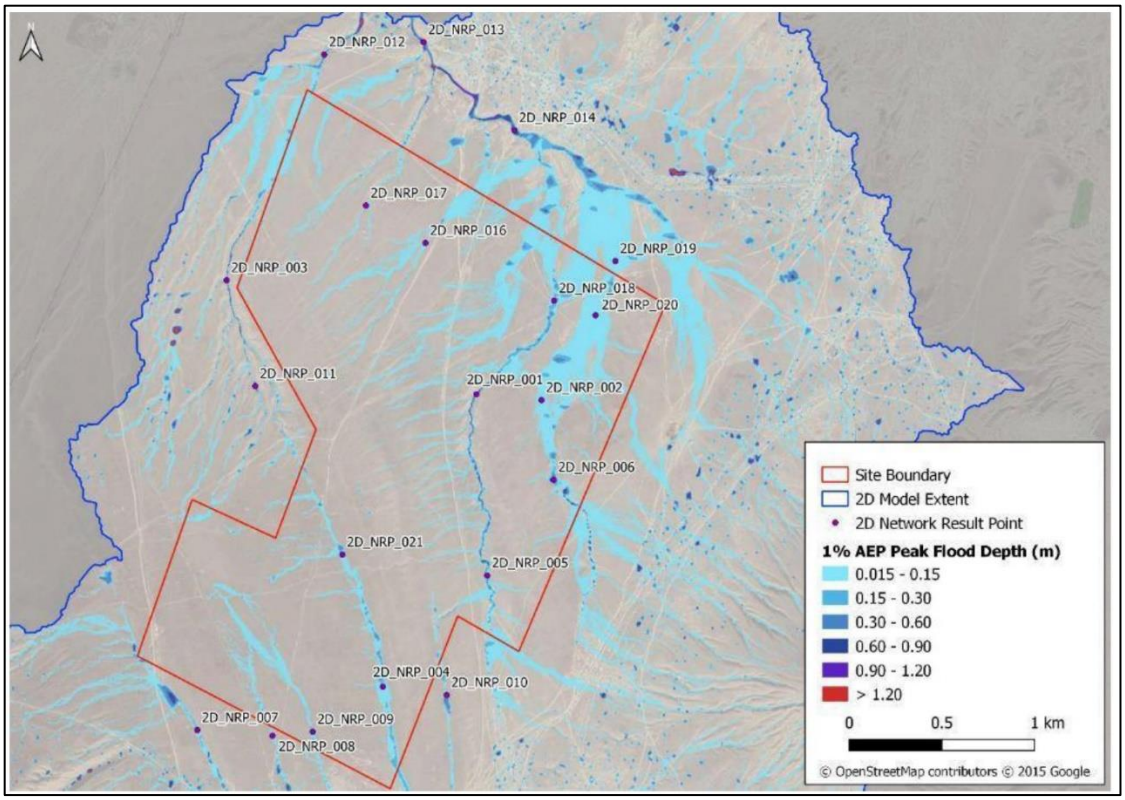


Figure 7-7: 1 % AEP maximum flood depths and result point locations[34]

7.3.4 Hydrogeology

Considering the geological-structural features of the region, three large areas can be distinguished (Figure 7-8[36] and Figure 7-9[37]):

- Group A (1) – Greater Caucasian hydrogeological basin.
- Group B (2) – Kura depression hydrogeological basin.
- Group C (3) – Lesser Caucasian hydrogeological basin.

The three groups can in their turn be subdivided in further hydrogeological subbasins (Figure 7-8[36] and Figure 7-9[37]):

- Greater Caucasus basin. It is characterized by the development of joint-veined stratal-porous fresh groundwater. This region has developed mud volcanism.
- Absheron region. Fresh groundwater is found in the Upper Pliocene and Quaternary rocks and is widely used for the local water supply.
- Kura-Araz depression basin. A wide distribution of groundwater can be noted here. Fresh soil and confined groundwater are mainly found in deposits of cones of river sediments and are widely used for the water supply of inhabited localities and for ground irrigation.
- Lesser Caucasus basin. Fresh ground and confined waters are found in river valleys only and are confined to gravel and sandy formations of Quaternary age.
- Talysh mountain region. Soil waters are widely distributed. Fresh confined waters, mainly connected with gravel-shingle and sandy deposits, have been found as well.

The study area is outlined in black within Figure 7-8 and included in the Greater Caucasian hydrogeological basin area.

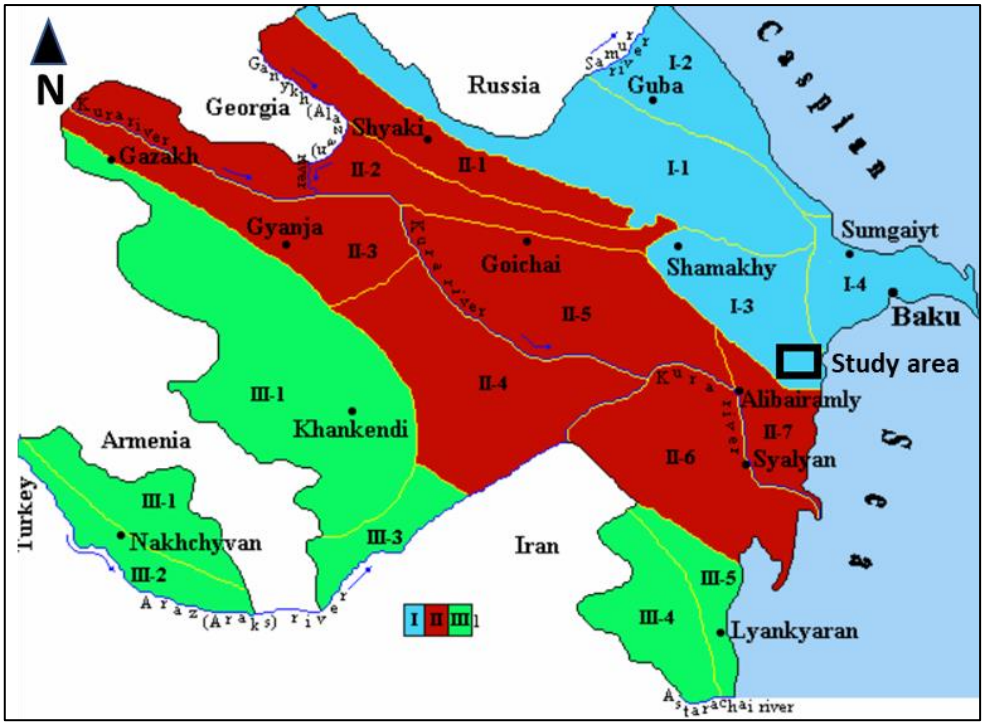


Figure 7-8: Hydrogeologic zones in Azerbaijan: I – Greater Caucasian hydrogeological basin; II – Kura depression hydrogeological basin; III – Lesser Caucasian hydrogeological basin. Study area is outlined in black and included in the Greater Caucasian hydrogeological basin area.[36]

The Absheron Peninsula is characterized by complex hydrogeological conditions, being the eastern continuation of the Greater Caucasus mountainous and fold zone.

Lack of surface waters, scarceness of atmospheric precipitations, high evaporability and dominance of clay deposits in geological profiles, low permeability of water-containing deposits and salinity of rocks do not enable formation of considerable groundwater which is useful for consumption.

Reportedly, within the Project AoI, all farms have metal or concrete reservoirs of water for animal watering, and ponds near the farm are made from earthen dike, where rainwater is collected, and in the absence of rain, the ponds are filled with imported water. Depending on the location of the farm, drinking water and water for animals are brought either from the Gobustan settlement or from neighboring villages in the Hajigabul region.

[36] Use of groundwater models for managing serious urban water issues in Baku, the capital city of Azerbaijan. K. Howard et al. International Symposium on New Directions in Urban Water Management. 12-14 September 2007, UNESCO Paris

Under natural conditions, the sporadic groundwater occurrence is peculiar to the peninsula. Over the last 30-35 years, the area of sporadic groundwater occurrence decreased sharply. Waterless rocks turned into aquiferous ones and previously waterless territories are now exposed to threat of underflooding. Within the area of the Peninsula, pressurized and non-pressurized groundwater is found in layers, which are represented till the depth of productive strata by limestone, sandstone, sand and clayey sand sediments of Quaternary Age. There is a considerable difference between hydrogeological conditions of Western Absheron and those of Eastern Absheron.

Occurrence depth of non-artesian aquifers varies from several centimeters to 25-30 meters. Yield of exploratory wells fluctuates between 0,2-0,4 l/s and 3-4 l/s. Permeability varies in the range of 0,1-0,2 and 5-7 m/day. Yield of exploratory wells drilled in confined aquifers is approx. 0,5-1,0 l/s and permeability changes from 0,2 till 13,6 m/day.

Geostructural regions	Hydrogeological basins
A. Fold Mountains Area of the Greater Caucasus	1. Porous-fractured water basin of the Greater Caucasus; 2. Shamakhy-Gobustan porous-stratal and fractured water basin; 3. Porous-stratal water basin in Absheron Peninsula; 4. Samur-Gusarchay porous-stratal water basin;
B Fold Mountains Area of the Lesser Caucasus	1. Porous-fractured water basin of the Lesser Caucasus; 2. Nakhchivan porous-fractured water basin; 3. Talysh porous-fractured water basin;
C. Kur-Araz Lowland	1.Sheki-Zagatala porous-stratal water basin; 2.Gyanja-Gazakh porous-stratal water basin; 3.Garabagh porous-stratal water basin; 4. Mil porous-stratal water basin; 5. Jabrail porous-stratal water basin; 6. Nakhchivan porous-stratal water basin; 7.Shirvan porous- stratal water basin; 8. Mugan-Salyan porous- stratal water basin; 9. Lenkoran porous- stratal water basin; 10.Porous-stratal water basin in Neogenic foothills of Jeiranchel; 11. Porous-stratal water basin in Neogenic foothills of Ajinour .

Figure 7-9: Main Hydrogeological basins of Azerbaijan. Study area is outlined in red.[37]

[37] Groundwater of Azerbaijan. Prof.Dr. Adishirin B.Alakbarov

The groundwater water system, as expected, is dominated by the presence of older (connate) water associated with the upwelling and decompression of saturated sedimentary material. Evidence of this can be observed from a review of photographs of the mud volcanoes, where water ponds are noted in surface depressions close to these sources.

Rates of modern groundwater recharge are expected to the low, given the low annual average rainfall (typically less than 200mm year) combined with the potentially low permeability of the superficial material, given the dominance of clay rich sediments.

The geotechnical survey carried out by Arpa Consulting in August 2020[38] confirmed no water table has been detected during geological boreholes drilling at maximum depth of 10 m b.g.l, in accordance with regional setting. This confirms either that the water table is deep or that the sediments do not form a significant aquifer due to the low permeability of the substrate.

7.3.5 Water quality

From surface water analysis, no perennial watercourses have been detected within the Project site, so no data for water quality evaluation are provided. Lack of drinking water of good quality was reported during consultations, especially in Gobustan.

7.3.6 Water resource

The National Policy Dialogues on Integrated Water Resources Management in Azerbaijan is in place for managing water resources in Azerbaijan. Sources of water include 30% from rivers, 40% from lakes, 20% reservoirs and the remainder from springs and groundwater.[39]

There is a main water pipeline from Kura to Baku which supplies the Garadagh District.

As discussed above, within the Project AoI, all farms have metal or concrete reservoirs of water for animal watering, and ponds near the farm are made from earthen dike, where rainwater is collected, and in the absence of rain, the ponds are filled with imported water. Depending on the location of the farm, drinking water and water for animals are brought either from the Gobustan settlement or from neighboring villages in the Hajigabul region.

[38] Report on Geotechnical and Geological Survey of 200 MW Solar PV in Alat. ARPA Consulting in a consortium with Mercados-Aries International August 2020

[39] Groundwater of Azerbaijan, by Adishirin B. Alakbarov (hydrology.nl)

7.3.7 OHL hydrological baseline

The study area is located downstream of the River Kur, close to the mouth of the river. The altitude of the Kura watershed ranges from 4,500 m to the Caspian Sea. The flow in the spring flood periods makes up 58-64% of the total annual discharge with 19-22% of the total discharge during the summer-autumn period and 17-20% in winter.

Groundwater resources of the area are confined to the aquifers formed by Quaternary sedimentary series. These waters are mainly characterized by high mineralization levels, varying from 0.5-1.6 g/l near the riverbeds of Pirsaatchay and Gozluchay and in the higher reliefs, till 10-20 g/l in the depressions and close to the Caspian seacoast. Chemical composition of the waters is also variable changing from hydrocarbonate-calcic to sulfate-chlorine.

7.4 Impact Assessment

This section describes the potential impacts of the Project (construction, operation and decommissioning) on the water resources, including groundwater and ephemeral watercourses (seasonal surface water); potential impacts that could be generated by:

- Clearing and grading that could alter surface water drainage patterns.
- Seasonal surface water quantity and quality could be affected by construction activities due to additional sediment load given increased erosion and surface water runoff.
- Accident/unplanned event: seasonal surface water could be directly contaminated through accidental fuel / oil spills, discharge of effluent or sewerage into the water course or leakages due to unproper waste disposal.
- Accident/ unplanned event: groundwater resources could be contaminated through accidental fuel spills or improper waste management.

Perennial surface water bodies are excluded from assessment as not present in the AoI, as mentioned in the baseline section.

The following are therefore assessed to be the potential impacts on the receptors characterized in sections above, following with the criteria outlined in Chapter 4.

7.4.1 Construction Impacts

During construction, earthworks, road construction and use of heavy vehicles could alter surface drainage patterns. The removal of vegetation and compaction of soils will reduce infiltration and surface run-off will increase. The risk is greatest during severe precipitation events. The increased volume of water flowing down drainage channels and creeks is likely to cause additional soil erosion and increase the size of the channels. Surface run-off will also contain larger amounts of suspended sediments during construction than would otherwise be the case.

7.4.1.1 Impacts on water resources

The main water requirement during construction would be water for concrete production in case of concrete foundations and dust suppression. An additional supply of potable water will be required for the workforce.

Construction workers must have easy access to a source of clean potable water. Drinking water must meet local or World Health Organisation (WHO) drinking water standards and water quality must be monitored regularly[40]. IFC / EBRD workers' accommodation guidance states that (dependant on weather conditions and accommodation standards), 80 to 180 litres of water per person per day should be made available. The anticipated maximum work force is around 420 at its peak and, with an average of 130 litres per person per day. At its peak workforce during construction there would be 54,600 litres/day required to cover the needs of the workforce (or 54.6 m^3 per day). On average considering the months where less workers are present, there would be around 24,115 litres required per day (or 24 m^3/day).

Assuming a construction phase of 18 months (24 m^3/day*30.4 days (average)*18 months) would result in a total water requirement of 13,133 m^3 for the workforce.

During construction, it is estimated that 10,045 m^3 of water is required over the 18-month period. This averages at 18.3 m^3 per day however it is noted that some months will require greater water use than others.

There is no available groundwater or water supply sources available close to the area of Project. The nearest state water intake which belongs to Azersu (utility company) is

40 http://documents.worldbank.org/curated/en/604561468170043490/pdf/602530WP0worke10Box358316B01PUBLIC1.pdf

around 11 km away from the site. Discussions are underway with the utility company and an official application is in progress. It has been confirmed with Azersu that there would be no issues supplying the amount of water required for the Project.

7.4.1.2 Impacts on flood and drainage characteristics and pattern

A hydrology study has been carried out for the Project site, details are provided in Section 7.3.3. This was utilised to inform the assessment of flood risk.

The sensitivity is considered low as there are no permanent water courses / perennial surface water bodies (receptors), which could be used for irrigation or farming purposes.

Broad scale 2D direct rainfall modelling was carried out to provide an overview assessment of flood risk across the proposed Project site. The only notable source of flood risk to the Project site is considered to be pluvial, from runoff arising from extreme rainfall. This is evidenced by the ephemeral channels draining to the north in the northern and eastern portions of the site evident from aerial photography.

The majority of the Project site is typically at low risk of flooding, with predominantly shallow (<0.15m) peak flood depths.

The greatest flood risk, both in terms of depth and velocity, is anticipated within the entrenched drainage channels that drain the Project site area flowing north and south-east, whilst an extensive region of shallow water flooding is anticipated in the north-east portion of the Project site across all flood events. The magnitude of the effect is therefore predicted to be Moderate as there is some potential for flooding in parts of the site, albeit for very limited periods generated by short periods of intensity rainfall.

The significance of the impact is assessed as Low and therefore not significant.

Nevertheless, a number of mitigation measures have been proposed to protect surface water resources.

7.4.1.3 Impacts on groundwater

The construction activities will not have a direct impact on groundwater; the significance of the impact is assessed as negligible and not significant as:

- The sensitivity of the receptor (groundwater) is to be considered low as the water table has been acknowledged to be located at a depth greater than 10 m b.g.l. (maximum depth investigated at a site where no water was detected) (Par.8.3.4).

- The magnitude of the effect is predicted to be low since the activities will only affect the shallow soil (piles for mounting structure of solar modules will be placed at a maximum depth of 3 m) and no disturbance or any leakage is expected to have the potential to affect groundwater.

7.4.2 Operational Impacts

The post-construction phase will include site remediation, clearance and deposition of debris off the site, restoration of areas where construction activities temporarily disturbed the environment, repairs and replacements of failed parts.

Water resources consumption during operation is expected to be minimal, around 4 m^3 estimated per day in addition to bottled drinking water for any workers attending the Project site during operation. This is considered negligible compared to construction, since dry cleaning of solar panel is foreseen, and minimal water required for onsite personnel for potable use.

Upon post construction site restoration, Project operation phase will require mainly routine maintenance activities.

7.4.2.1 Impacts on flood and drainage characteristics and pattern

The Project will introduce impermeable surfaces to the site area through mounting structure system, the substation, areas of hardstanding etc. increasing surface run off during periods of rain and subsequently increase the risk of flooding. However, prior to mitigation, this is considered to be of negligible to minor significance impact.

The significance of the impact is assessed as negligible and not significant as:

- The sensitivity of the receptors is to be considered low as there are no perennial surface water body in the Project area which could be used for irrigation or farming purposes.
- The magnitude of the effect is predicted to be low given the presence of water only in certain areas (ephemeral watercourses located in the northern part of the site) and for very limited periods generated by rainy phenomena of short intensity and rare, the site is located in an arid area (Par.7.3.3 Flood risk).

7.4.2.2 Impacts on groundwater

Potential sources of pollution to groundwater during operation are mainly related to leaks and spills due to maintenance activities.

The operation activities will not have a direct impact on groundwater; the significance of the impact is assessed as negligible and not significant as:

- The sensitivity of the receptor (groundwater) is to be considered low as, based on the geological survey outcomes and the hydrogeological regional setting, water table has been acknowledged to be located at a depth greater than 10 m b.g.l.
- The magnitude of the effect is predicted to be low as any leakage is expected to have the potential to affect groundwater. In addition, groundwater extraction is not expected to be required.

7.4.3 Decommissioning

Effects on water resources during decommissioning are likely to be similar to those during construction, so sensitive features such as ephemeral drainage channels would need to be avoided. Contaminated materials such as oil storage tanks would need to be removed from the site and taken to a suitable disposal site to prevent future contamination of surface and groundwater.

Given the seasonal nature of rainfall in the region and the absence of perennial surface water bodies, as for construction and operation phases the impact is assessed as negligible and not significant.

7.5 Mitigation

Mitigation principles have been identified to align with the relevant IFC Performance Standards (IFC PS 3 – Resource Efficiency and Pollution Prevention and PS 6 – Biodiversity Conservation and Sustainable Management of Living Natural Resources).

7.5.1 Construction

To reduce the potential for erosion of drainage channels during road construction, routes will be selected to avoid ephemeral drainage channels where possible. Culverts or other drainage control features will be installed where crossings of drainage routes are unavoidable. The actual size and location of culverts will be dependent on the specifics of the hydrology at the Project. The Project drainage system will ensure that runoff rates from the site remains at or less than current conditions.

The risk of contamination through temporary storage facilities will be reduced through the storage of all materials within designated areas. Supplies will also be provided for the clean-up of minor spills. Spill prevention measures will be set out in the Construction Environmental Management Plan (CEMP) to prevent accidental spillage of fuels, chemicals or other harmful substances. This will include specific details regarding spill control measures and equipment, clean-up and remediation actions, spill review measures, incident reporting and records, training and monitoring requirements.

A Hazardous Materials and Waste Management Plan and Emergency Preparedness and Response Plan will be produced for the construction phase to mitigate impacts.

To reduce the risk of soil and water pollution from leaks and spills through storage of oil it is recommended that:

- A designated storage area is established with an impervious base and impermeable walls.
- All fuel, oil and chemical storage is stored in a designated secure area.
- Hoses and valves are checked regularly for signs of wear and ensure that they are turned off and securely locked when not in use.
- Diesel pumps and similar items are placed on drip trays to collect minor spillages. Trays will be checked regularly, and accumulated oil removed.

Temporary facilities to be used during construction will consist of a temporary compound. The compound will include a parking area, a generator with fuel storage, and temporary buildings to provide accommodation (as required) and support facilities for managers and workers, secure storage, site offices, and welfare and first aid facilities. The storage of fuel for the on-site construction vehicles and equipment will be secured in a temporary bunded facility to prevent the possibility of leakages and soil contamination.

Mitigation works to reduce/minimize impacts for flood risk include:

- Surface water will be controlled with appropriate drainage and bunded areas as appropriate.
- Infrastructure that is most vulnerable to flooding, is located in areas of lowest flood risk (i.e. areas of solar PV panels to be located outside of the main flood risk corridors).
- Construction and access roads have, as so far as possible, been routed outside of areas of highest flood risk (noting that at some locations roads will need to cross high flood risk corridors).

- Where this is not possible, flood mitigation measures will be defined in the detailed Project design.

7.5.2 Operation

The potential for soils and groundwater contamination associated with waste disposal will be reduced through the reduction of wastes to the extent possible whilst maximising the re-use and recycling of materials where possible. All waste and garbage will be collected, segregated and stored before disposal in at a location to be agreed with the Local Government respective officer or environmental officer.

Mitigation measures associated with maintenance and use of oils and other chemicals include:

- Establish a designated storage area with an impervious base and impermeable bund walls and protected from precipitation.
- Store all fuel, oil and chemical storage in the designated secure area.
- Check hoses and valves regularly for signs of wear and ensure that they are turned off and securely locked when not in use.
- Place diesel pumps and similar on drip trays to collect minor spillages. Check trays regularly and remove any accumulated oil.

7.5.3 Decommissioning

During decommissioning it is recommended that:

- Structures are recycled and other materials sent to a suitable disposal site.
- All containers are capped, and all valves closed then transported to a suitable disposal site.
- To reduce effects on drainage channels, vehicles, equipment, and foot traffic will be confined to demarcated areas.
- After roads or other compacted areas are removed and / or abandoned, scarify soils and plant native grass seeds. This will be monitored and repeated until reclamation is successful for at least two growing seasons after the last planting / seeding.

A Decommissioning and Site Restoration Plan will be developed prior to the decommissioning phase.

7.6 Residual Effects and Conclusions

The assessment has identified areas of activity, particularly during construction and decommissioning operations that have the potential to impact on the hydrology and hydrogeology of the site.

With the implementation of mitigation measures outlined in Section 7.5, it is considered that there will be no residual impacts on the hydrology and hydrogeology environment.

8 Geology and Soils

8.1 Introduction

The following chapter deals with the main aspects related to the geology and soils baseline conditions as well as the assessment of the potential impacts on those receptors at the Project site.

8.2 Assessment Methodology

Baseline data has been collected from site visits and desk-top studies[38], particularly the geotechnical and geological field survey activities carried out by ARPA Consulting in August 2020. The assessment of potential impacts has been undertaken in accordance with the criteria outlined in Chapter 4.

8.3 Baseline Conditions

8.3.1 Geology

The dominant geological structures of the Caspian region were formed during the period of tectonic movements that resulted in the formation of the Caucasus Mountains and the associated basin and plateau structures that form the Caspian and adjacent onshore regions. Numerous erosional alterations to the landscape have occurred since the original structures were formed. Ensuing periods of tectonic compression (mainly during the Late Pliocene period) resulted in the production of a number of folded structures within the region, forming a number of anticlines (upward thrusting folds).

The Project Area is located on the Southeast end of the Greater Caucasus Mountains on the south-eastern part of Absheron peninsula, within the Samaxi-Gobustan structural zone. In this region topography is relatively flat near the shoreline. The Project area is located within a valley (Shachikaya wadi) characterized by relatively flat areas on which the Shachikaya Wadi and its tributaries are located and relatively high hills at the sides mainly characterized by mud volcanoes. It is situated on the most asymmetric part of the subzone represented by independent Dashmardan, Galajig-Baridash, Gilij-Goltug, Solakhay, Ayrantokan, Goturdagh and Dashgil-Delaniz anticlinal highs. Apical parts of these anticlines are complicated by a number of reverse faults and overthrusts and transverse faults and strike-slips. Usually there are large mud volcanic edifices confined to the junctions between these dislocations.

Specifically, the Project area is located on Dashgil-Delaniz anticlinal high. A section of the high is built by Pliocene (Absheron, Pontian) and Miocene sedimentary series. Pontian rocks of the apex are transgressively overlapped by the Balakhani suite series, which are in turn covered by a breccia of Dashgil mud volcano. Both limbs and eastern periclinal part of the high are surrounded by a thin layer of Absheron series which are exposed on the limbs and partly covered with a breccia of the Alat volcano.

Near the Project site it is possible to observe the presence of:

- A regional deep fault that limits large longitudinal folding and block steps (code 1 – Figure 8-1).
- A regional deep fault that limits transverse mega-blocks (code 4 in Figure 8-1[41]).
- A local fault corresponding to the boundaries of transverse block segments (code 5 – Figure 8-1.
- Two large interregional diagonal volcanic centres spread north-west, north-east and west of the Project area (code 7 – Figure 8-1[41]).

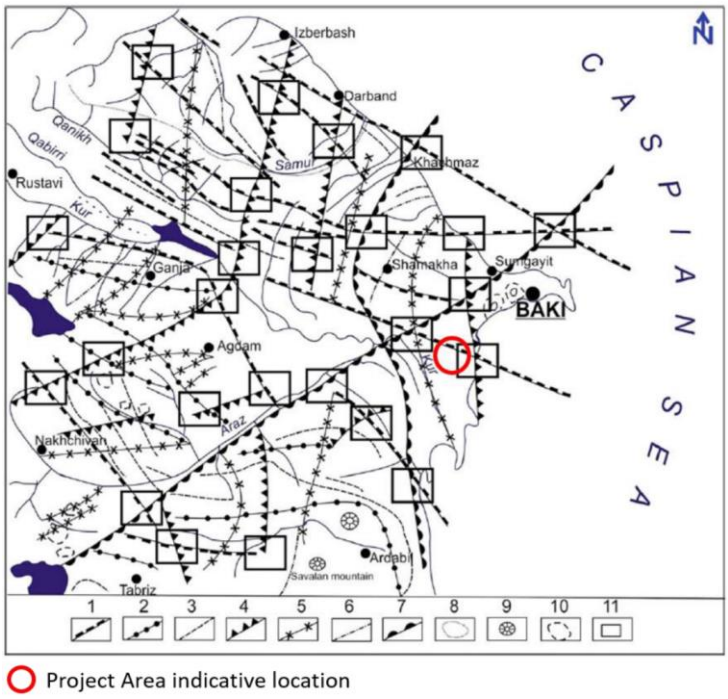


Figure 8-1: Map-scheme of morphotectonic intensity of the Eastern Caucasus and adjacent territories[41]

[41] Geosciences of Azerbaijan: Volume I "Geology"; Geology Institute - Azerbaijan National Academy of Sciences and Tel Aviv University; 2016.

8.3.1.1 Mud Volcanoes

The eastern territory of Azerbaijan is characterized by the widest distribution, as well as by the presence of all existing types of mud volcanoes. The total number of mud volcanoes and mud volcanic manifestations in Azerbaijan is 353 (154 of them are marine). In comparison with other geographical regions, mud volcanoes of Azerbaijan also distinguish by the number of eruptions and daily gryphon, sopka and salse activity.

The eruption of the mud volcano is usually accompanied by a powerful explosion, deep cracks extending for several kilometers, a 300-350 m high flame (with the predominance of carbon, the eruption occurs without flame) and the release of a large volume of mud volcanic breccia onto the Earth's surface.

Alike the other parts of the Langabiz-Alat subzone and the rest of Shamakh-Gobustan zone, surroundings of the Project area are characterized by high mud volcanic activity. There are more than 30 mud volcanos in the surroundings of the area, characterized by different sizes and activity characteristics. All volcanos edifices are confined to the faults. The largest volcanos form up to 500 m high conical landforms with slopes covered with volcanic ejectas, e.g. clayey muds rock fragments of rocks. All mud volcanos of the area are concentrated along north-west to south-east trending line which corresponds to the strikes of the area's major anticlinal highs.

As depicted in Figure 8-2, four volcanos are well known in the vicinity of the Project area, including three situated to the east (Goyarchin, Dilangaz and Dashgil – the last is officially Gobustan Mud Volcano), and one volcano located to the south (Goturdagh), but the area is the most widespread zone of mud volcanoes in the country. Goturdagh and Dashgil are of a touristic interest too whilst the other two volcanos are sensitive environmental elements. Goturdagh and partly Dashgil could also be assessed as sources of potential hazard in the area. Of the four volcanoes, only two (Dashgil and Goturdagh) are considered active.

The largest of the cited volcanos, Goturdagh volcano, is 153 m high, located 4.7 km to the south of the area and known to be among the largest mud volcanos in the Southern Gobustan. The first historically recorded eruption of the volcano took place in 1989. Since then, several more eruptions occurred, including the strongest 2005 eruption which produced 235 thsd m^3 of breccia.

The other three volcanos are located 2.7-3 km to the east of the site. The most prominent among these volcanos is Dashgil volcano which has large (200 m in diameter) and continuously active crater with 45 salsas and griffons. The volcano produces up to 700 m^3/day of gas, and the total volume of its' historically erupted breccia exceeds 260 mln m^3. The other two volcanos are also continuously active but relatively weaker. The third largest volcano of the area is Goyarchin volcano, which has a total breccia spread area of 510 ha, breccia volume of 204 mln m^3 and average thickness of 40 m. The third minor volcano is Dilangaz volcano which is represented by two groups of griffons and salsas distributed on the total area of 550 ha. 33 volcano vents are continuously active. Total volume of the ejected breccias exceeds 165 mln m^3.

The Institute of Geology and Geophysics of the National Academy of Sciences, particularly the Mud Volcanoes Department, works on predictions of potential hazards and scientific recommendations based on preventive measures. Also, the Institute worked on the risk assessment related to mud volcanoes in the seaport area to be built near the Alat settlement, implemented by the Department of the Mud Volcano Sciences of the Institute of Geology.

In terms of risks of eruption, due to the rugged terrain (the presence of deep ravines, hills, depressions, etc.) and the slope of the terrain in a southern direction in the Project area, impacts are considered Minor since the eruption materials cannot reach the Project site.

The road chosen for the delivery of equipment, materials, machinery and personnel to the Project site will not be adversely affected by any volcanic eruption due to distance.

It should be noted that, during the presentation of the ESIA results in the Ministry of Environment, the employees of the Ministry were informed about this in detail, where they were shown maps of the location of volcanoes and photographs of the area.

Before construction begins, it is recommended that the Mud Volcano Sector of the Institute of Geology of the Academy of Sciences provides an official opinion on the status of volcanoes identified around the Project site, including the frequency of their eruption, the amount of emitted breccias, their distribution area, the composition of gas emissions, etc.

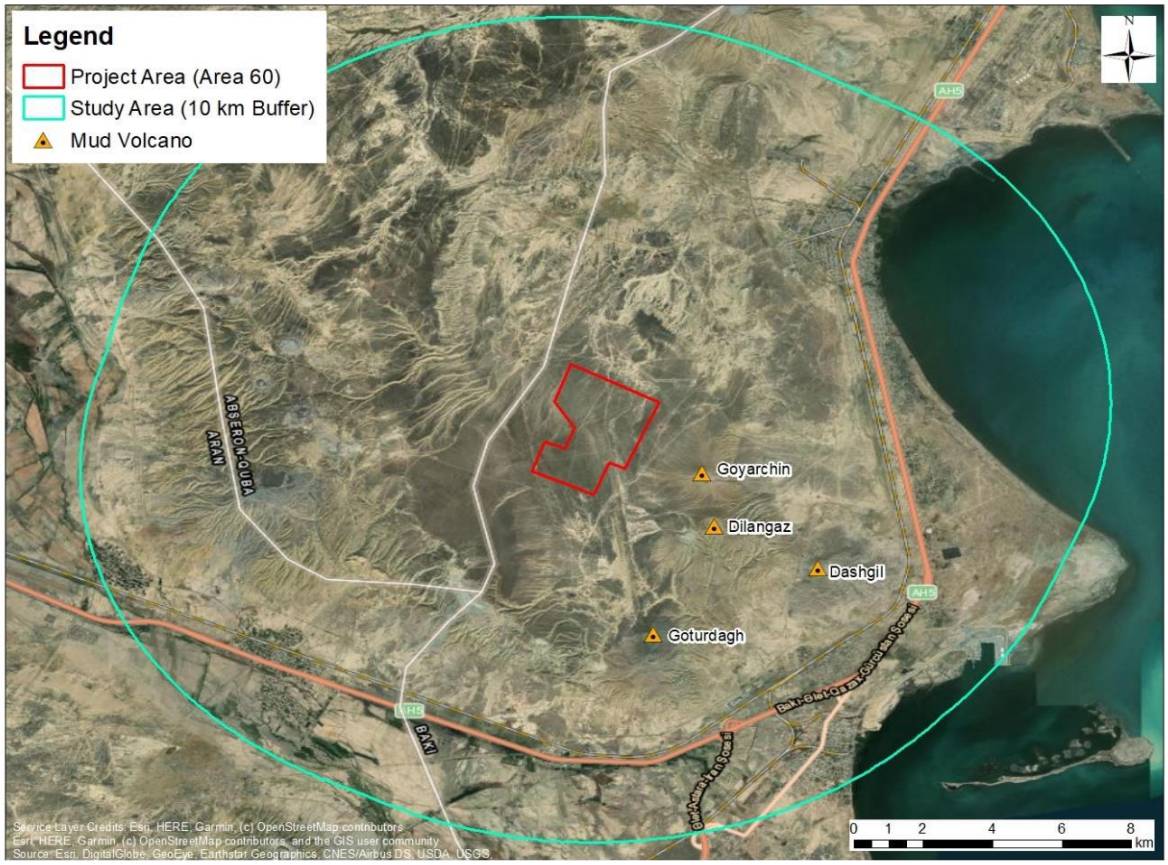


Figure 8-2: Distribution of mud volcanoes within the Study Area

8.3.2 Geomorphology

The Project site is located on the south-eastern part of the Transcaucasian depression, as shown in Figure 8-3[38], on the west side of the Baku-Alat-Astara highway, characterized by low hillocks. The area is a slightly sloping, plateau area with uneven relief, and in the southeast, south, southwest direction, the territory is replaced by hillocks with a slope to the north. Generally, the south-west sides of the Project site are relatively high, with hills, and in the outer parts there are nomadic (farm-type) sites.

According to the topographic plan, the elevation values of the area ranges from a minimum of 60 m AMSL to a maximum of 149.0 m AMSL. The slope of the relief varies between 1-2˚ for the total area. Geomorphologically, it is composed of Neogene deformed sedimentary rocks, located on temperate and weakly fragmented syncline plateaus and ridges.

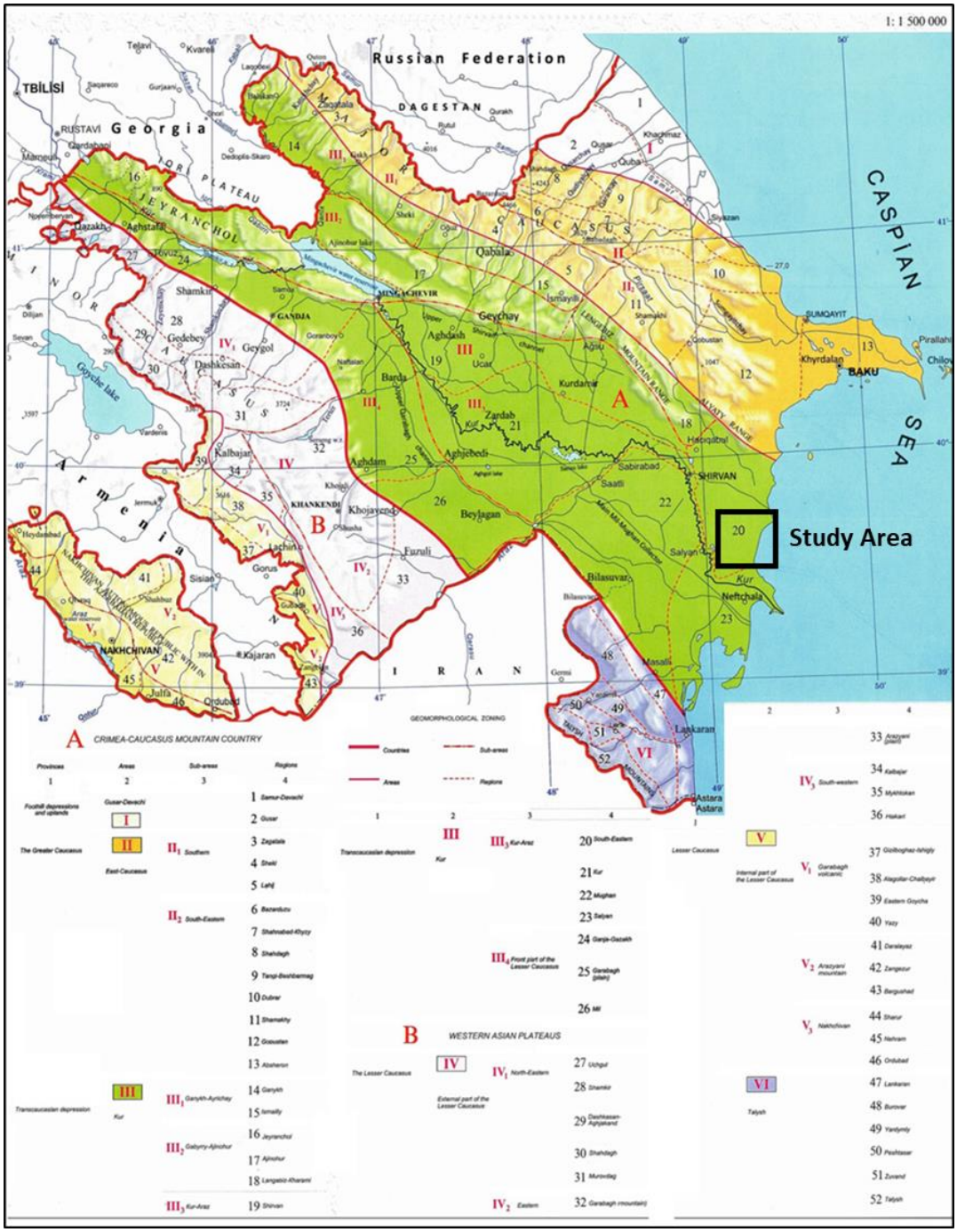


Figure 8-3: Geomorphological map of Azerbaijan (project area approximatively located inside the outlined black area)[38]

8.3.3 Seismicity

The territory of the Azerbaijan Republic is located in the Caucasus segment of complex Alpine-Himalayan mountain-fold system. Earthquakes with different intensities occur in the region depending on a number of factors, to include tectonic structure and geological environment specifics, seismic focus depth, tectonic movement amplitude, deformation type, etc.

There have been many catastrophic earthquakes (M≥6) historically within the territory of Azerbaijan. In recent years, destructive earthquakes have included Aghdash (June, 1999), Lankaran (1999), Baku (November, 2000) and Zagatala (2012). Seismic events with different intensity levels are regularly observed in the Project area and its surrounding territories as well.

According to the Map of the Seismic Activities Classification of the Republic of Azerbaijan, Garadagh district of Greater Baku is in the Zone 8-point earthquakes that may occur on the Richter scale. Most earthquake epicenters are located offshore but some are confined to the Ajichay-Alat zone of faulting dislocations. The strongest earthquake which historically occurred in the area's surroundings was the 2000 Baku earthquake. This occurred on November 25 at 22:09 (18:09 UTC) local time with an epicentre just offshore Baku, Azerbaijan. It measured 6.8 on the moment magnitude scale and the maximum felt intensity was VII on the Mercalli intensity scale. It was followed three minutes later by a quake measuring 5.9.

8.3.3.1 Local Conditions

Seismic investigations were performed during field survey activities carried out by Arpa Consulting in July 2020. The boundaries and thicknesses of the layers were determined using the Refracted Wave Method (RDM) and Multi-Channel Analysis of Surface Waves (MASW). According to the seismic zoning map of the Republic of Azerbaijan, the background seismicity of the area is 82 points (once in 1,000 years 8-point earthquake).

As a result of the investigations, the seismic soil class can be classified as 2 for calculations, in accordance with the local norms of Azerbaijan (AzDTN Sesimic map). Main characteristics are:

- Soils: Rock soils with voids in the structure, low-moisture or moist, large and medium density, coarse and medium-grained sands, gravelly sands, consistency coefficient iL ≤ 0,5; hard clays and clays with porosity coefficient e < 0,9, sands with e <0,7;

- Propagation speed (m/s): 500-800;
- Calculated resistance of soils (R0kqq/sm2): 3-10.

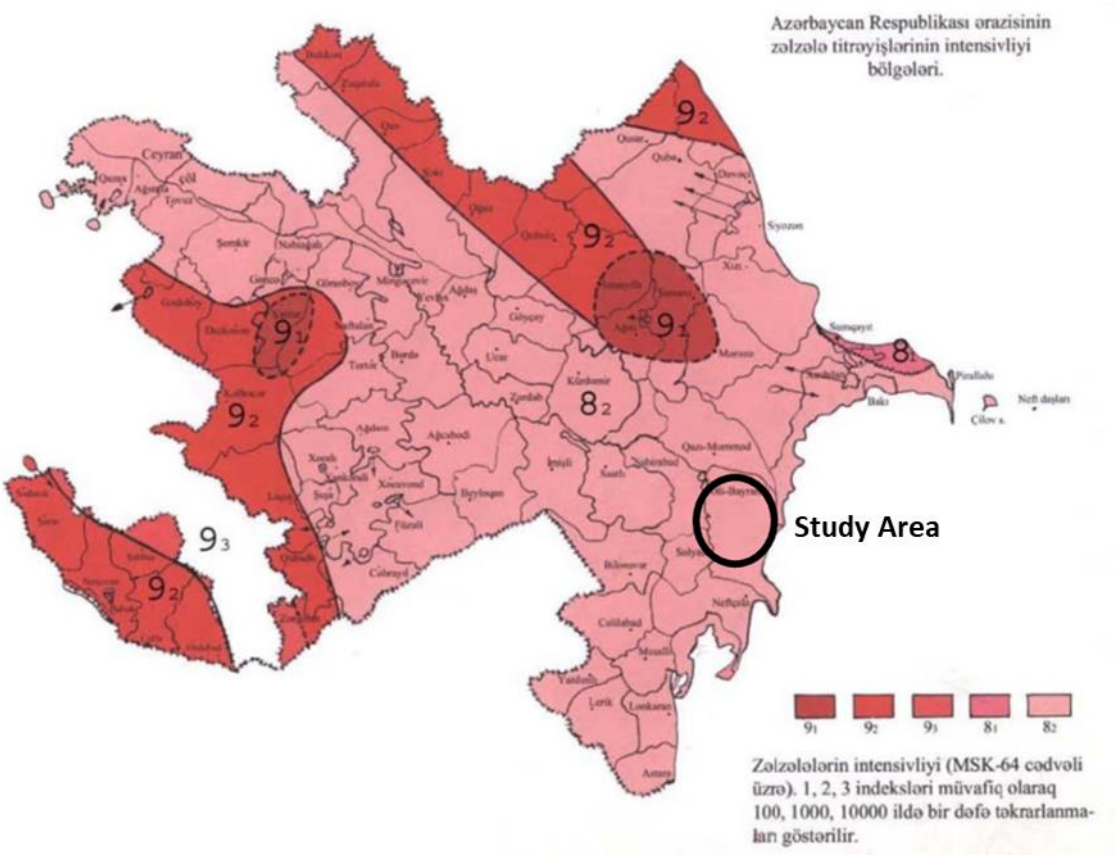


Figure 8-4: Seismic zones of Azerbaijan according to AzDTN seismic (1989)[42]

The ThinkHazard website[43] details that the Baku region is medium classification for earthquake hazards. This means there is a 10% chance of a potentially damaging earthquake in the next 50 years. Based on this information, the impact of earthquakes will be considered in all phases of the Project, in particular during design and construction.

[42] https://www.dlubal.com/en-US/load-zones-for-snow-wind-earthquake/seismic-azdtn-2-3-1.html#&center=40.34960254292586,48.63628437209375&zoom=7&marker=40.401,49.851

[43] https://thinkhazard.org/en/report/495-azerbaijan-absheron-baku/EQ

8.3.4 Soils and local stratigraphy

The Project area is characterized by semiarid type of soils. Gray salt marshes, consisting of grey soils, are widespread. Soil seems to be hard alluvial clay with good cohesiveness According to the "Ecological Atlas" of the Azerbaijan Republic, this type of soil formed over young alluvial deposits. Humus content of these soils is 1.5-2%, with high carbonate and low nitrogen content. The mechanical composition is characterized by increased level of foliation. Formed under arid environment, these soils become covered by fractures and cracks during summers. The degree of land erosion varies within 15-20%, corresponding to the average risk of erosion.

The lands are not used for any agricultural purpose, except for partial use as winter pastures. During the site visit (July 2020 by ARPA Consulting in a consortium with Mercados-Aries International), no contamination of the site, waterlogging, soil embankments, or garbage dumps were detected. Activities are summarized in table 8.1 and results are discussed in the following chapter.

Table 8-1: Site investigation summary table [38]

No	Description of field work	Unit measure	Number
1	5.0 m depth geological survey boreholes	r.m	28
2	10.0 m depth geological survey boreholes	r.m	6
3	3.0 m depth bore pits (Trial Pit)	item	33
4	Geogysical seismic works	item	5
5	Electrical survey (VES)	item	6
6	Heat conduction	item	18
7	Penetrometer test	item	29

Stratigraphy of the Project site has been assessed by geological boreholes and is main represented by clay soils. These clays are grey and yellowish-brown-grey in color, contain carbonate dust veins, sandstones, sand layers, sometimes stratified. All over the area, alluvial-deluvial sediments of the Modern Period of dusty clay, formed by the accumulation of these root rocks, containing "white eyes" and sometimes small pebbles, are widespread. These sediments are mainly 2.0 m, and in some parts even 5.0-6.0 m deep. Across the site, the soil surface is covered with a layer of soil and vegetation 30-40 cm thick.

Based on the cross sections investigated with electrical resistance tests (VES), it has been acknowledged that the project area consists of clay soil, clay interlayers between loamy soil layers, sand interlayers between loamy soil layers, sand layers between layers of clay and rocks of fine gravel.

In addition, results from the dynamic cone penetrometer and pressure meter test identified the presence of hard clay layers. The clay in the Project area is very stiff-hard and have a very good bearing capacity estimated for very solid-hard clay layers data. Layers are normally consolidated and show no bearing capacity problem.

8.3.5 OHL geology and soils baseline

8.3.5.1 Geology and tectonic structure

Geological structure of the study area is represented by Quaternary deluvial-proluvial-eluvial, alluvial-proluvial and partly alluvial deposits.

Within the framework of geomorphological regions of Azerbaijan, the study area is located on the cross-borders of the eastern segment of Greater Caucasus mountainous province, and the eastern Kur-Araz segment of the province of the South Caucasus depression.

Tectonically, the study area is confined to a junction of the Shirvan zone within Lower Kur megazone from one side, and the Langabiz-Alat subzone within the Vandam zone of Greater Caucasian Kakheti-Vandam-Gobustan megazone from the other.

There are 12 volcanos detected in the closest vicinities of the area, including 2 volcanos situated directly within or next to the buffer zone (Pirgari, Sariboga), and 10 volcanos located in the corridor proximity (Yandere, Galmaz, Kichik Mishovdagh, Boyuk Mishovdagh, Neftli Gobu, Gizdagh, Ayranteken, Goturdagh, Dilangyaz, Goyarchin).

The largest of the cited volcanos is 279 m high Boyuk Mishovdagh volcano located 820 m to the north of the OHL route and known to be among the largest mud volcanos in the Southern Gobustan.

Another group of volcanos crosses the OHL route in it's north-western segment. Located on the Alat ridge and tectonically confined to Ayranteken anticline, the group is represented by Goturdagh, Saribogha and Ayranteken. The largest of these volcanos is Goturdagh (205 m). It is a continuously erupting volcano, consisting of the 2 groups of craters.

8.3.5.2 Soils

Soil cover of the study area is represented by the following soil types:

1. Meadow-grey soils cover the largest part of the area, especially the longest southern segment of the OHL route.

2. Typical and salinized solonchak. This soil type is limitedly spread to the east of Shirvan and to the southeast of Toragay mountain, where it has deluvial and alluvial origin;
3. Partly salinized and saline greyish and grey-brown soils are spread in the western segment of the route.

Granulometric composition of the soil cover is represented by moderately loamy sands and clays. Soil forming rocks are mud volcano breccias. All soil types are subject to intensive anthropogenic load, and moderately, somewhere weakly supplied with main nutrition elements (phosphorus, kalium). The soils are subject to intensive wind, irrigation and water erosion. Salinity level of the soils is average, making up 0.5-1.0%, and developed due to the exposure of salty formations.

8.4 Assessment of Impacts

This section describes the potential impacts of the Project (construction, operation and decommissioning) on soil that could therefore be affected as follows:

- Erosion.
- Loss of soil resource.
- Contamination.

Potential impacts that could be generated by:

- Vehicle traffic along dirt tracks used during construction of on- and off-site roads, photovoltaic modules, electrical substation and the temporary construction compound will cause soil compaction.
- Off-road vehicle traffic will damage vegetation and cause soil compaction.
- Any vegetation and some soil will be removed for the photovoltaic modules, electrical substation, temporary construction compound and both on- and off-site roads.
- The use of heavy equipment will cause soil compaction if used outside designated roads.
- Movement of staff and materials to and from the site along the access roads.
- Movements across the site for operation and maintenance.
- Accident/unplanned event: Occasionally contaminated surface water (ephemeral watercourse) from accidental fuel/oil spills, effluent discharge or sewage may contaminate soil.

- Surface water could be directly contaminated through accidental fuel / oil spills, discharge of effluent or sewerage into the water course or leakages due to unproper waste disposal.

The following are therefore assessed the potential impacts on soil, in accordance with the criteria outlined in Chapter 4.

8.4.1 Construction

Expected impacts on soils during construction phase are mainly related to activities such as levelling, earthworks, temporary facility construction, any trenching and excavation.

Where roads are un-surfaced, rutting and gully erosion eventually makes the roads impassable so that vehicles may drive off the track and the area affected by erosion continually widens.

Soil compaction and loss of limited vegetation present increase the soils' vulnerability to erosion. Soils will be particularly vulnerable during the rainy seasons, when vehicle traffic along dirt tracks used during construction of on- and off-site roads is likely to cause the greatest damage.

Once the paving and revamping works on Qobustan road and the construction of the access road in proximity to the Project site is completed, the expected off-road traffic will be minimal. Indeed, these operations will be properly carried out to allow heavy vehicle traffic (water trucks, repairs, supply or large equipment, etc.).

8.4.1.1 Soil erosion and loss of soil resource

The following types of construction activity could lead to potential soil erosion and dust generation:

- Vehicle traffic along dirt tracks used during construction of on- and off-site roads will cause soil compaction.
- Off-road vehicle traffic will damage any vegetation and cause soil compaction.
- The use of heavy equipment will cause soil compaction if used off roads.

Soil compaction and loss of vegetation increases the soils' vulnerability to erosion. Soils will be particularly vulnerable during any periods of wet weather, when vehicle traffic is likely to cause the greatest damage.

Where roads are un-surfaced, rutting and gully erosion eventually makes the roads impassable so that vehicles drive off the track and the area affected by erosion continually widens.

Damage to soils has further effects on land use. When soil is compacted, it cannot support the native grasses, and this in turn reduces the pasturage that can be used by the livestock of local herders. In addition, the loss of grass affects biodiversity, since grassland is a food source for small mammals, which in turn provide food for predators.

Furthermore, during the summer months, the soils in the area are often dry. Activities can result in dust generation with impacts on surrounding grazing lands and livestock. In addition, there may be significant geological resources within the Project area, which could restrict the use of these resources during the Project's life.

The significance of the impact has been assessed as minor as:

- The sensitivity of the soil receptor is to be considered low since the portion of land that will be involved in construction activities to date is used only partially for farming and livestock grazing.
- The magnitude of change is considered medium during the construction phase because the work activities will impact a large portion of the soil present in the Project area but for a limited period. Once foundations have been buried and roads have been narrowed, a much smaller area will be affected, and previously disturbed areas will have been reclaimed.

Nevertheless, a number of mitigation measures have been proposed to protect the soil by the erosion phenomena.

8.4.1.2 Soil Contamination

There is the potential for soils to be contaminated as a result of chemical spills or oil leaks from machinery, as well as incorrect disposal of waste, including accidental discharge of sanitary or other wastewaters to the local environment.

The significance of the impact has been assessed as minor as:

- The sensitivity of the receptors is to be considered high as to the current state of knowledge the soil in place, without protection, would absorb any contaminants generated by a spill.
- The magnitude of change is considered very low during the construction phase because the spill or leaks of substances would affect extremely small and contained areas and considered unlikely to happen. Wastes will be disposed of by a licensed hazardous wastes collector / operator and transported to a licensed waste site in compliance with international best practices.

Inert waste will be taken off-site and disposed of in a suitable landfill site. The procedure to assess final disposal facilities will be part of the Hazardous Materials and Waste Management Plan.

Storage and sealing of hazardous materials and wastes will take place in dedicated areas on site. There will be hazardous substances storage areas with special warning signs, instructing the staff on the rules of conduct in ordinary and emergency situations and utilization of wastes in accordance with national legislation and International Standards.

Since residual waste is considered to be very low in quantities, the significance of the impact is assessed as minor.

Nevertheless, a number of mitigation measures have been proposed to protect the soil by spills or leaks.

8.4.1.3 Volcanic eruption

In terms of risks of eruption, due to the rugged terrain (the presence of deep ravines, hills, depressions, etc.) and the slope of the terrain in a southern direction in the Project area, impacts are considered Minor since the eruption materials cannot reach the Project site.

The road chosen for the delivery of equipment, materials, machinery and personnel to the Project site will not be adversely affected by any volcanic eruption due to distance.

Before construction begins, it is recommended that the Mud Volcano Sector of the Institute of Geology of the Academy of Sciences provides an official opinion on the status of volcanoes identified around the Project site, including the frequency of their eruption, the amount of emitted breccias, their distribution area, the composition of gas emissions, etc.

The prevailing wind directions in the Project area are north and north-west and therefore smoke and dust from volcanic eruptions will not result in a significant impact.

8.4.2 Operation

During this phase of the Project, the main impacts on soils would be mainly related to vehicle traffic. There should be no need for vehicles to travel off the improved roads, and this will be actively discouraged.

As described with regard to the construction phase impacts, the main risk to soils would be where vehicles leave prepared roads and drive cross-country. If designated roads are not used, vehicle movements can cause damage over a wide area. The magnitude of the effect during operation is very low, since there will be much less frequent traffic than during construction, and only occasional use of heavy equipment. In addition, vehicles will keep to improved roads. The significance of the impact is assessed as minor.

8.4.3 Decommissioning

Similar to construction, soils will be highly vulnerable to traffic and erosion during decommissioning. The movement of materials off-site may involve the construction of temporary roads and use of large vehicles. Similar measures to those outlined for the construction phase will need to be taken to minimize impacts on soils. Reinstatement of land and after-care will be critical to mitigating the damage to soils.

The panels and supports will be dismantled or replaced with new ones and steel and other useful materials will be recycled. Inert materials which cannot be recycled will be taken to a suitable disposal site. However, foundations and other inert belowground materials will be buried. This is not likely to have a significant impact on soils as it will not prevent re-vegetation or restoration of land.

8.5 Mitigation

8.5.1 Construction

General mitigation measures to be applied during construction include the following:

- Clearly demarcate storage and staging areas and store all materials, equipment and vehicles in demarcated area to reduce soil damage. Furthermore, vehicles will be confined to demarcated roadways.
- Establish native grasses in erosion control channels and in other areas immediately after final disturbance.
- Salvage and store topsoil and subsoil before areas are excavated, with topsoil stripped and stockpiled separately.
- Segregate excavated soils into stockpiles dependant on material type and provide erosion control while stockpiled.
- On completion of earthworks, backfill material in the same stratigraphic sequence.
- Placement and compaction of gravel where needed, excavation of a drainage ditch along uphill sides where appropriate, and placement of low berms on downhill sides where necessary.

- If narrowing access roads following construction, scarify compacted areas and establish native grasses, where possible given the conditions, in any soil-based channels that are constructed alongside the road.
- Once construction and road-building are complete, scarify all areas compacted by off-road vehicle / equipment movements and establish native grasses.
- Store all materials within designated areas of temporary storage facilities and provide supplies to clean-up of minor spills.
- The source of material for road construction is currently unknown, in case there will be the need to source it from a nearby quarry. Clay materials at site are not recommended to be used as road and construction fill.
- Confine all vehicles and equipment to the roadway and, to extent possible, minimize activities during wet conditions. When activities must occur in wet conditions, control storm water by using fabric, straw bales or other measures to impede storm water flow and prevent erosion.
- When damage to wet soil occurs, repair once dry conditions return.
- For storage of oil, establish a designated storage area, with impervious base and impermeable bund walls. Capacity must be sufficient to contain full volume within a bund and secured area.
- Store all fuel, oil and chemical storage in the designated storage area.
- Check hoses and valves regularly for signs of wear and ensure they are turned off and securely locked when not in use.
- Place diesel pumps and similar items on drip trays to collect minor spillages. Check trays regularly and remove any accumulated oil.
- Reduce the amount of waste to the maximum extent possible.
- Collect all solid waste and store until transported to the designated disposal site.

Mitigation measures and monitoring to ensure containment of cleaning water contaminated with concrete at settlement ponds. The ponds will be fully lined with a plastic liner to ensure no seepage into the ground can occur. These measures will be expanded upon within the Hazardous Substances and Waste Management Plan.

The Hazardous Materials and Waste Management Plan will include procedures for handling and storing redundant/broken PV panels on the Project site (for example, ensuing these are bunded or stored in a covered area of the site).

In relation to seismic hazards, both temporary and permanent buildings will comply with foreseeable climatic and seismic loads at the Project site in accordance with National legislation / building standards. This will be considered at the detailed design stage on appointment of the EPC Contractor.

Details will also be included in the Emergency Preparedness and Response Plan developed prior to construction in relation to actions to be taken and evacuation procedures in the event of an earthquake or volcanic eruption during the construction phase.

8.5.2 Operation

Several measures are recommended during operation of the Project to reduce damage to soils. These include:

- Confine all vehicles to roadways.
- Monitor road condition regularly; then repair damaged and rutted roads rather than bypassing damaged sections.
- Monitor erosion controls and repair as needed.
- Where possible, maintain grass cover on berms and ditches.
- Prohibit use of vehicles and equipment off prepared roads.
- Re-stabilize existing eroded tracks and restore grass cover as needed.
- Do not collect firewood from the site.
- Reduce wastes to the extent possible and maximise re-use of materials with recycling opportunities investigated by the O&M Contractor. Collect, segregate and store all waste and garbage before disposal at the designated site.
- Clean up and store oily and chemical waste and contaminated material before transport to the designated disposal site to reduce risk of soil and groundwater contamination.
- Establish a designated storage area with an impervious base and impermeable bund walls and protected from precipitation. Capacity must be sufficient to contain full volume within a bund and secured area.
- Store all fuel, oil and chemical storage in the designated secure area.

The operational Hazardous Materials and Waste Management Plan will include procedures for handling and storing redundant/broken PV panels on the Project site (for example, ensuing these are bunded or stored in a covered area of the site).

Details will also be included in the Emergency Preparedness and Response Plan to be updated for the operational phase in relation to actions to be taken and evacuation procedures in the event of an earthquake or volcanic eruption during the construction phase.

8.6 Residual Effects and Conclusions

The most significant impacts on soils have been assessed as Minor during construction as a result of potential erosion from vehicle traffic, topsoil stripping, soil compaction and the use of heavy equipment. Impacts will be relatively short in duration, lasting only through construction. Following implementation of the proposed mitigation measures, the residual impact is considered to be Negligible.

During operation, impacts on soils are less significant and mainly confined to vehicle traffic. The main risks are associated with vehicles leaving the prepared roads and driving cross-country. With mitigation implemented, these risks will be removed, resulting in no residual impacts.

9 Archaeology and Cultural Heritage

9.1 Introduction

Archaeological and cultural heritage is important as a source of valuable historical and scientific information, as an asset for economic and social development and as an integral part of a people's cultural identity, practices and continuity. In particular, cultural heritage refers to tangible forms of cultural heritage, such as tangible property and sites having cultural, artistic, and religious values, as well as unique natural environmental features that embody cultural values, such as sacred groves. Intangible forms of culture, such as cultural knowledge, innovations and practices of communities embodying traditional lifestyles, are also included.

This chapter assesses the potential impacts of the Project and associated works on any archaeological and cultural heritage assets in the surrounding area. Mitigation is proposed where appropriate to reduce adverse impacts and enhance benefits where possible.

9.2 Assessment Methodology

The archaeological and cultural heritage assessment has been largely based on desk-based studies and on the findings gathered through on-site surveys carried out during both the Scoping and the ESIA phases (in July 2020 and in April 2021 respectively) by Sulaco specialists. Cultural beliefs and traditions and formal and informal heritage sites have been investigated during the site visits through visual observations and consultations with relevant communities and stakeholders (especially as regards the intangible cultural heritage sites) – community leaders, farmers, State Tourism Agency, Institute of Archaeology and Ethnography, Gobustan Reserve Director, Ministry of Culture.

The onsite activities were primarily aimed at:

- Identifying any sign of archaeological monuments and sites of formal and informal cultural heritage at the Project site and within the wider 10 km Study Area (to gather further baseline information on this topic).
- Assessing the presence of sensitive areas of archaeological and cultural heritage in the Project site and in the wider surroundings, especially the Project Area of Influence.
- Taking photos of the identified objects and determining their coordinates using GPS device.

- Verifying the value and connection of identified archaeological monuments/sites to cultural heritage and traditions.

The collected information has been utilised to guide the assessment of potential impacts. The method of assessment has been based upon that which is outlined in Chapter 4 (Assessment Methodology).

9.3 Baseline Conditions

All historical and architectural monuments located in Azerbaijan which are protected by the State are included in the List of Immovable Historical and Cultural Monuments of National Importance, approved by the Resolution of the Cabinet of Ministers of the Azerbaijan Republic dated 02.08.2011 No. 132. The following table contains an extract from the above-mentioned list, with focus on objects of cultural heritage located in Garadagh District.

Table 9-1: List of immovable historical and cultural monuments of national importance located in Garadagh District

Inventory Number	Name	Historical name	Location
Architectural Monuments			
105	Caravanserai	XIV Century	Garadagh railway station
106	Caravanserai (Karachi)	XV Century	Sangachal settlement, Miejik territory
107	Tomb of Sofi Hamid	XVII Century	Sangachal settlement, Miejik territory
108	Caravanserai	XV Century	Sangachal settlement
Archaeological Sites			
492	Ovdan (underground reservoir)	XVII Century	Sangachal settlement, Miejik territory
493	Ovdan (underground reservoir)	XV Century	Sangachal settlement
494	Ovdan (underground reservoir)	XV Century	Sangachal settlement
495	Ovdan (underground reservoir)	XVIII Century	Bibi-Heybat station

Within the Study Area, the only recognized heritage resource protected by the State is the *Qobustan State Historical and Artistic Reserve*. The Project Area itself is located near Kichikdash Mountain, where the concentration of Gobustan rock carvings is high.

During the site walkover, no direct or indirect evidence of cultural and archaeological value indicating the presence of any signs of an ancient settlement (i.e. cultural layer, remains of ancient settlements, household utensils, etc.) were detected within the Project site boundary. The Project site surroundings are used by herders or ethnic groups engaged in traditional livestock practices.

Based on the feedback received from the Institute of Archaeology and Ethnography by the Azerbaijan National Academy of Sciences (ANAS) during stakeholder engagement activities performed in April 2021, the area is historically important from an archaeological point of view and the risk of findings within the Project Area cannot be totally excluded. Also, the potential presence of burial mounds (ancient tomb monuments) in the Study Area is noted by the Ministry of Culture. The Director of the Gobustan National Historical-Artistic Reserve reported that in 2020, Gobustan National Historical-Artistic Reserve together with the Institute of Archaeology and Ethnography of ANAS studied two mounds on the north side of the Project Area through archaeological excavations (approximate location unknown at the time of writing).

Furthermore, two cemeteries have been identified in the vicinity of the Project area during the surveys conducted onsite. Of these, the old one is located south of the Project site, while the most recent one is located North-West to the Project site

9.3.1 Gobustan (Qobustan) Rock Art Cultural Landscape

As shown in Figure 9-1, part of the Qobustan National Park officially "Qobustan Rock Art Cultural Landscape "World Heritage (WH) Site, an open-air museum with a huge collection of priceless historical artifacts, which is located around 1.8 km in east – north-east direction from the Project area. This is a hill and mountain site occupying the south-east end of the Greater Caucasus mountain ridge. The site has outstanding universal value for its rock art engravings, for the substantial evidence the collection of rock art images presents for hunting, fauna, flora and lifestyles in pre-historic times and for the cultural continuity between prehistoric and mediaeval times that the site reflects. As a result of archaeological research in the Qobustan Reserve, more than six thousand carvings on 1000 rocks, ancient dwellings-caves, about 40 mounds, more than 100 thousand objects of material culture were discovered. The most ancient carvings date back to the Mesolithic

era, but it is believed that life existed there before, which allows considering Qobustan one of the cradles of civilization.

A decree of 1950 put the property under the control of the State Authorities and closed all stone quarries in the area. The Qobustan State Historical-Artistic Reserve is protected by a decree since 1966. This general protective law is reinforced by laws concerning the protection of historical and cultural monuments and their utilisation (1978 and 1998), and by decrees concerning the implementation of these laws (1998) and on special authorisation of excavations (2000).

The Qobustan Rock Art Cultural Landscape was included in the World Heritage List in 2007 and received UNESCO's status of enhanced protection during the eighth session of the Committee for the Protection of Cultural Property, held in Paris in December 2019. The Responsible Government Institution is the Cultural heritage Division of the Ministry of Culture and Tourism of the Republic of Azerbaijan. The reserve attracts hundreds of tourists from dozens of countries around the world each year.

The cultural and archaeological evidence is localized in three confined WH Sites, while a buffer zone is set around them for maintaining the outstanding universal value, including conditions of integrity and authenticity of the property. The WH Site closest to the Project area is located 3 km far in east direction and the distance between the Project area and the WH Buffer Zone results to be around 1.8 km (Figure 9-1).

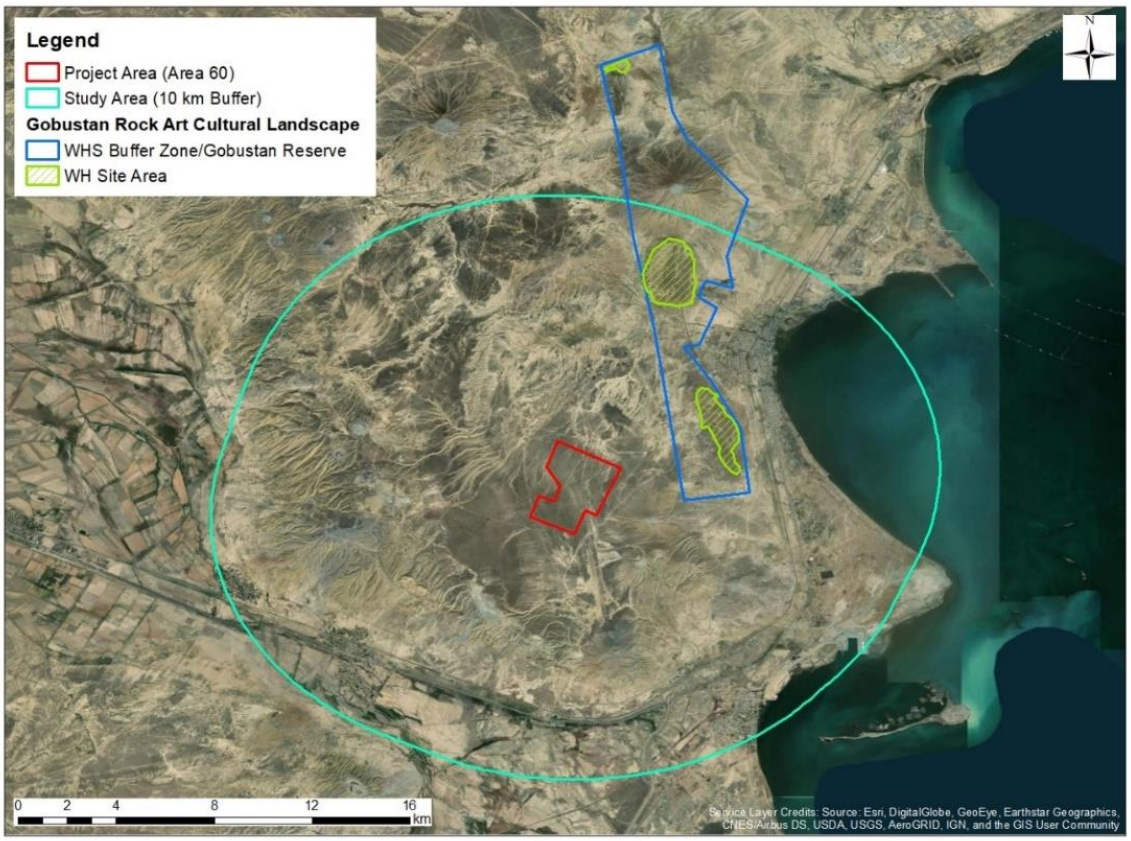


Figure 9-1: Location of the WH Sites and Buffer Zone within the Qobustan Rock Art Cultural Landscape with respect to the Project Area and the Study Area location[44]

9.3.2 Cemeteries

In the territory of Gobustan, cemeteries are traditionally not only burial places, but also sacred places considered holy by the locals. As shown in Figure 9-2 and in the following pictures (Figure 9-3), two cemeteries (Gara Atli cemetery and Khanali cemetery) were detected as sensitive elements in the vicinity of the Project site:

- A recent fenced-in Muslim cemetery, where the funeral practices still occur, located at the distance of about 1.2 km from the north-western boundary of the Project area.
- A more ancient cemetery, still used for funeral practices, located around 0.35 km from the southern boundary of the Project area.

[44] http://whc.unesco.org/en/list/1076/

Since the field studies were carried out when restrictions due to COVID-19 were in force, only few people either on the site or outside of it could be interviewed to collect any additional information about the origin of the cemeteries. According to one of the visitors met on-site, the recent Muslim cemetery belongs to the Shamly people living in the Gobustan settlement of the Garadagh District and in some villages of the Hajigabul Region.

According to the List of Immovable Historical and Cultural Monuments of National Importance, which was approved by the Resolution of the Cabinet of Ministers of the Azerbaijan Republic No. 132 in August 2011 (Table 9-1), the identified cemeteries are not elements of cultural heritage protected by the State.

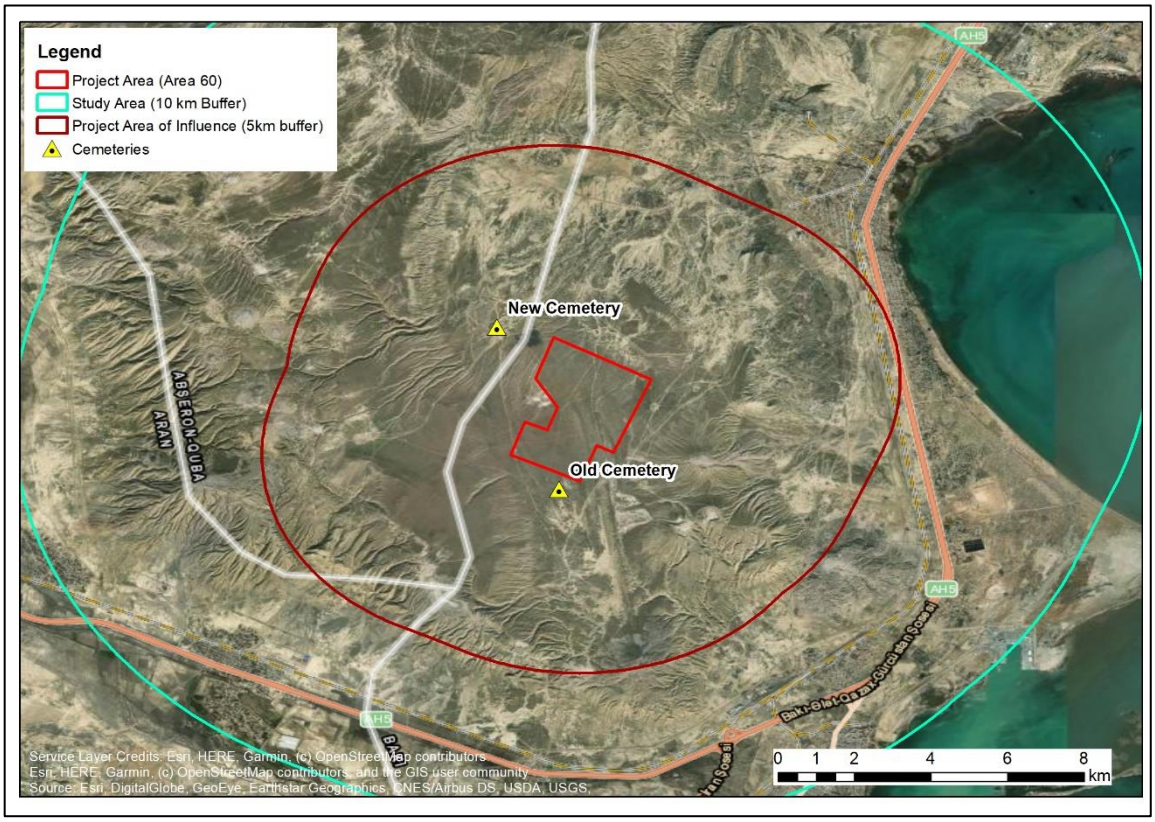


Figure 9-2: Location of cemeteries detected in the vicinity of the Project Study Area and within the 5k buffer Project Area of Influence

Figure 9-3: Pictures of the new (above) and old (below) cemeteries located in the Study Area

9.3.3 Other Culturally Relevant Areas

One of the main tourist attractions in the area are world-famous mud volcanoes. The majority of these volcanoes are protected by the Ministry of Ecology Natural Resources. They have been declared natural resources under the order of the country's leader. It has unique value and is an attractive area for tourists.

As of early May 2021, the Government of Azerbaijan is planning to establish a geopark in an area including a group of mud volcanos located more than 10 km North-West of the Project site. The improvement of infrastructure in these culturally relevant areas is a strategic goal reported by the Ministry of Culture (interviewed in April 2021). A new two-lane local highway of 8 m width is also being developed to facilitate tourist access to the volcanoes and to improve the road infrastructure for residents. The new road starts from the entrance to the Gobustan Nature Reserve (located almost 6 km North to the Project site) and runs in the North-Western direction for 21 km, at a distance of around 4 km from the Project area.

In addition, as anticipated in Section 8.3.1.1, out of the four volcanos detected in the vicinity of the Project area, Goturdagh and Dashgil are considered as natural resources of touristic interest; these volcanoes are located 4.7 km South and around 3 km South-East to the Project site.

9.4 Assessment of Impacts

Potential impacts on archaeological values and cultural heritage can include impacts on the setting of designated sites or direct impacts on below-ground archaeological remains as a result of ground disturbance during construction, disturbance to religious and aesthetic sites, disruption of cultural traditions and formal and informal heritage sites / intangible cultural heritage sites.

The Project Area of Influence incorporates a 5 km buffer from the Project site and includes a portion of the Gobustan Reserve UNESCO site (archaeological relevant area - Figure 9-1). In addition, the Project surroundings (out of Gobustan Reserve UNESCO site) are used by herders or local farmers engaged in traditional livestock practices. Furthermore, stakeholders' consultations confirmed the importance of the two cemeteries located within the Project Area of Influence as traditionally not only burial places, but also sacred places considered holy by the locals. The potential presence of burial mounds (ancient tomb monuments) within the Project Area of Influence cannot be excluded as well.

That said, it should be noted that during the site walkover in July 2020 and April 2021, and further geotechnical investigations conducted by the Company in the area, no direct evidence of cultural and archaeological value indicating the presence of any signs of an ancient settlement (i.e., cultural layer, remains of ancient settlements, household utensils, etc.) were detected within the Project footprint. The site sensitivity is assessed to be **medium** following a conservative approach and considering the high attention of Institutional and local stakeholders on the conservation of that area nearby reserves of national importance and ancient cemetery.

Impacts on herders or local groups engaged in traditional livestock, pasture-winter livestock and on their traditional field of activity will be further investigated in Chapter 12.

9.4.1 Construction

The Project is not deemed to have a direct adverse impact on any international or nationally recognised cultural heritage or archaeological feature in the AoI. However, the following considerations are made:

- The presence of workers in the Project area, transportation of materials and equipment to the construction sites may impact on cultural areas, habits and aesthetic values.
- Potential for disturbance of previously undiscovered archaeological finds (burial mounds) during construction cannot be excluded as the Project will involve ground clearance activities such as levelling, grading and excavation works.
- Potential disruption/disturbance to access to cultural heritage features (cemeteries and related ceremonies) during construction may occur.

It should be noted that although there are no known archaeological or religious sites located within the Project footprint, the Gobustan Reserve UNESCO site and cemeteries are located nearby of the Project and considered of cultural significance. It is imperative that these sites are not disturbed further by the Project activities, such as transportation, or by the workforce. Given the distance from the site Gobustan Reserve UNESCO site is considered unlikely to be directly impacted by the Project, but even if unlikely on archaeological values, disturbance to local cultural heritage aspects and intangible assets are likely to happen (touristic values, herders or local farmers engaged in traditional livestock, funeral practices, living traditions & religious practices) and the magnitude of change is considered to be **moderate**.

As such, the potential impact on cultural heritage assets is considered **moderate**.

9.4.2 Operation

From consultation which has taken place, it is the stakeholders' perception that the visual impact of the Project may pose risks to the historical archaeological landscape of Gobustan region. During consultations, the Ministry of Culture stated that in the future, tourists will not only visit Gobustan alone or mud volcanoes. There are plans to develop a safari experience and take visitors to other monuments in the region (such as Seki-Zaqatala, etc). There is concern in terms of the extent to which the Project will affect their prospects in the future. The Gobustan Nature Reserve is a rare reserve, dating back more than 2,500,000 years, thus very important in terms of promoting Azerbaijan cultural and historical values in the world, as well as attracting tourists. At the same time, the Project is considered a great opportunity for the country and a clean energy Project.

Local leaders were consulted at the start of the engagement process and during the second round of consultation with regards to a number of elements including cultural and historical sites. Local people raised no concerns relating to the proximity of the site to cultural heritage features during the surveys and consultation which took place to inform the LRP.

There is the potential of indirect impacts on the setting of cultural heritage features as a result of new development. The presence of facilities may impact visual character and sense of place into the existing rural landscape, particularly when viewed from areas of cultural importance. From review of the landscape assessment, impact on Designated Areas (Gobustan Reserve) and Mud Volcanoes touristic area was confirmed to be moderate, while slight and not significant on Farmlands/Rural Areas.

Considering the above, the Project is therefore deemed to have a **slight** indirect impact on cultural setting thus not significant, since possible initial change are expected to be followed by rapid habituation which reduces the nuisance level.

9.4.3 Decommissioning

Impacts on cultural heritage assets are considered similar to construction phase. No impact on archaeological resources is expected.

9.5 Mitigation

Since the research area is located in the historical territory of Gobustan, the EPC Contractor will be required to put in place provisions for identification of unidentified or unexpected finds during below ground works.

Since the Project's land preparation and construction phase will involve earthworks and excavation activities, a Chance Find Procedure in accordance with the requirements of IFC PS8, EBRD PR8 and ADB Safeguard Policy (Cultural Heritage) will be developed and implemented in order to prevent potential harm to any undiscovered archaeological finds that might be present at the Project Area. Construction planning in relation to archaeology and the chance finds procedure will be detailed in the Construction Environmental Management Plan (CEMP).

The Project will comply with the requirements of Azeri Law with regard to management of any chance finds that may be discovered during the Project works. Azeri cultural heritage and environmental experts, as well as archaeologists, will be involved in the preparation of the procedure (e.g., experts from Institute of Archaeology and Ethnography of ANAS, Gobustan National Historical-Artistic Reserve representatives, which main tasks are the protection and promotion of all cultural values in the territory of Gobustan).

The Company will liaise and maintain open discussion channel with the Ministry of Culture, the Gobustan National Historical-Artistic Reserve together with the Institute of Archaeology and Ethnography of Azerbaijan National Academy of Sciences (ANAS) before and throughout construction phase.

The Chance Finds Procedure will apply to the construction phase. All the Project Company and the contractors' personnel will be informed about the implementation of the Chance Finds Procedure and related trainings will be provided.

In case of a chance find, all activities that may potentially harm the archaeological find will be ceased, the area will be secured, and the chance find will be recorded. The competent Authority will be notified immediately for further actions. The Project Company will collaborate with the authorities for the investigation of the site and will take relevant measures to avoid any further disturbance.

Within the scope of stakeholder engagement to be conducted during Project lifetime, ongoing information disclosure to communities will include any chance finds. The Project Company will also take necessary measures to ensure that the availability/accessibility to cemeteries in particular is not impacted by the Project during also the operation phase. In case of any grievance regarding intangible cultural heritage, the grievance will be responded to appropriately in compliance with the grievance procedure.

Detailed and regular information to local community members will be provided about Project activity to mitigate community concerns as a result of misinformation. The Project Company will consider scheduling construction activities to minimise the effects on local communities and farmers and to reduce impacts on the nearby cemeteries in case of rituals.

9.6 Residual Effects and Conclusions

There is the potential for residual impacts on any previously undiscovered sites and features that may be discovered during construction works. Mitigation measures will be put in place to alert the appropriate authorities to artefacts or evidence of past activity discovered. A Chance Find Procedure in accordance with the requirements of IFC PS8 and EBRD PR8 (Cultural Heritage) will be implemented to properly manage risks. With mitigation, it can be concluded that there would be no significant impacts associated with cultural heritage as a result of the Project.

10 Noise and Vibration

10.1 Introduction

The noise and vibration assessment considers potential effects relating to noise from the Project at noise sensitive receptors (NSRs). Noise can have an effect on the environment and on the quality of life enjoyed by individuals and communities.

The chapter provides details on the assessment methodology; the baseline conditions currently existing at the Project site and surroundings; the likely noise effects during the construction, operation, and decommissioning phases of the Project; the mitigation measures required to prevent, reduce, or offset any significant adverse effects; and the likely residual effects after these measures have been employed.

10.2 Assessment Methodology

British Standard BS5228-1:2014 *Code of practice for noise and vibration control on construction and open sites* has been used as reference for the assessment of construction impacts and generally calculations have been carried out to establish the worst-case scenario based on hemispherical spreading (SWL-10 〖log_10 [2 π(distance)^2], where SWL is the sound power level).

The Project is required to comply with national and international standards. The Azerbaijan noise standard is presented below.

Table 10-1: Azerbaijan noise standard

Description of area		Maximum allowable noise levels, lAeq (dBA)	
		Daytime 07:00 to 23:00	**Night-Time 23:00 to 07:00**
Residential area		40	30
Commercial areas		55-60	55-60
Hotels and hostels		45	35
Industrial areas	Special purpose workplaces	50	50
	Workplaces having permanent buildings or lands	80	80
	Workplaces- truck drivers	70	70

Description of area		Maximum allowable noise levels, lAeq (dBA)	
		Daytime 07:00 to 23:00	Night-Time 23:00 to 07:00
	Workplaces- Drivers of tractors and other similar vehicles and drivers of reclamation vehicles	80	80
Sensitive Areas	Hospitals and health centers	35	25
	Schools, libraries and conference rooms	40	40
Noise Standards QOST 12.1.003-83 UDK 534.835.46:658.382.3:006.354; Gost 12.1.036-81 ST SEV 2834-80			

The International Finance Corporation (IFC) Environmental, Health and Safety (EHS) General Guidelines[45] set out noise limits as shown in the table below. The IFC limits will be used as reference for the purposes of this assessment in addition to national limits, and whichever guideline value is the more stringent will be considered to evaluate Project's impacts. It should be noted however that IFC EHS Guidelines do not set noise limits particularly for construction activities and the guidance provides absolute noise level limits. Where the existing ambient noise level is above the prescribed level, it suggests that the noise source being considered should not elevate the ambient by more than 3 dB at the nearest off-site receptor locations.

Table 10-2: IFC EHS General Guidelines

Receptor	dB (One Hour lAeq)	
	Daytime (07:00 to 21:00)	Night-Time (21:00 to 07:00)
Industrial; commercial	75	70
Residential; institutional; educational	55	45

[45] IFC Environmental, Health, and Safety (EHS) Guidelines, 2007. Available at: https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/ehs-guidelines#:~:text=The%20EHS%20Guidelines%20are%20technical,and%20in%20IFC's%20Performance%20Standards.

10.3 Baseline Conditions

Current anthropogenic noise in the vicinity of the Project site is related to agricultural and domestic activities, as well as occasional vehicular traffic on local dirty road with low daily traffic flows volumes. No significant sources of vibration noted during the site visit performed by Sulaco in July 2020 and April 2021.

10.3.1 Sensitive Receptors

Identification of NSRs has been undertaken based on site survey outcomes performed in July 2020 and April 2021 and desk-based assessment. NSRs for the Project have been selected as places where human receptors / users might be affected by noise generation by Project activities within the established Project Area of Influence of 5 km. Based on these criteria, farms shown in Figure 10-1 are located within the Project AoI and are the nearest NSRs located up to 3.5 km from Project boundaries.

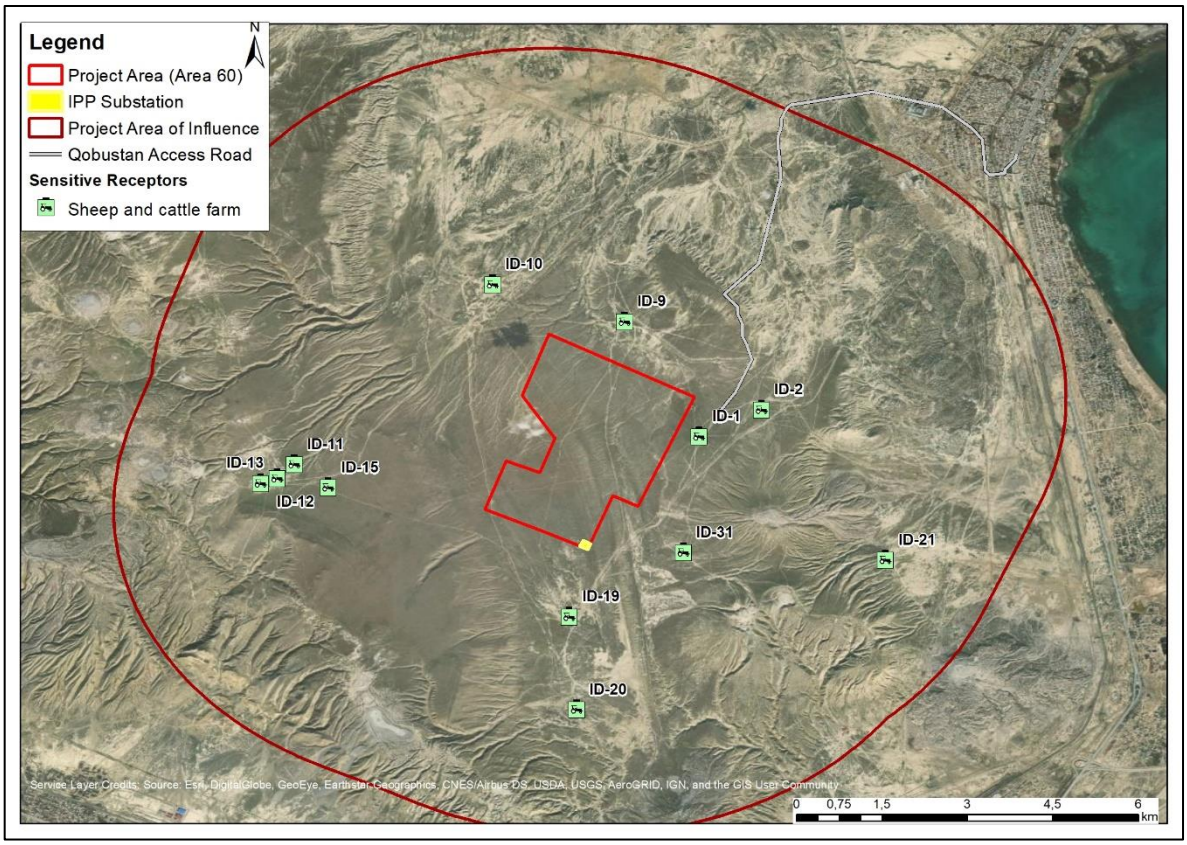


Figure 10-1: Noise sensitive receptors

The closest farm to the Project site is located approximately 300 m (ID-1) at its closest point to the east of the Project site boundary. The farm ID-9 and ID-2 are located respectively 700 m and 900 m to the north-east and to the east of the Project site boundary. Farm ID-31, 10 and 19 are respectively approx. 1 km E, 1.1 km NW and 1.2 km S from Project boundary. Remaining farms are located more than 2 km up to 3.5 km (ID-21) far from Project area.

10.4 Assessment of Impacts

The solar panels will be silent in operation, noise emissions are expected from the inverter units, transformers and from the substation building. For the purposes of this assessment, the substation transformer is the dominant source of noise during operation.

Additionally, the construction/decommissioning phases will result in short-term noise impacts from construction activities and vehicles traffic. The assessment is based on assuming the construction of the substation building as a worst-case construction noise scenario. Furthermore, noise emissions from panels installation and groundworks activities are considered for the entire site.

The definition of impact significance has been undertaken following methodology described within Chapter 4 of the ESIA.

10.4.1 Construction/Decommissioning Noise

There will be temporary and short-term noise impacts on NSRs from activities during construction and decommissioning. The magnitude of the noise impact during decommissioning phase is anticipated to be similar to the construction noise for a shorter period.

Potential impacts are expected mainly related to construction traffic, excavation works, construction of hardstanding, erecting array framework and erection of security fencing.

Construction works

A construction noise assessment has been undertaken based on British Standard BS5228-1:2014 assuming the construction of the substation building as a worst-case construction noise scenario. Furthermore, a construction noise assessment has been conducted considering the panels installation and groundworks on the entire site.

As shown in the Figure 10-1, the IPP substation building is proposed to be located at the south-east corner of the Project site covering approx. 1 ha. Considering the location of the substation, the distances of closest NSRs are the following:

- Farm ID-19/31: approx. 1.2 km to the south-east.
- Farm ID-1: 2.3 km to the north-east.
- Farm ID-20: 2.8 km to the south.
- Farm ID-2: 3.3 km to the north-east.

There is a small amount of worker accommodation required on the Project site (for housing up to 30 people). The location of this accommodation is not known at present and so the results of this noise assessment will assist in informing the location away from noisy areas of the Project site during construction.

The construction works noise assessment is provided in Table 10-3 below.

Table 10-3: Construction Works Noise Assessment – substation building

Phase	Sound Power Level at Source (BS5228:2014)	Noise Level at NSR* (assumed 1km distance)	Noise Level at NSR (assumed 1km distance) considering attenuation**
Ground preparation.	Dumper truck 118 dB SWL. Backhoe excavator 99 dB SWL.	50 dB	36.5 dB
Concrete preparation.	Cement mixer (petrol or diesel) 92 dB SWL.	24 dB	10.5 dB
Installation of transformer and inverter.	Delivery truck (4axle wagon) 110 dB SWL. Driven piling 103 dB SWL. Mobile telescopic crane (50t) 67dB spl 98 dB SWL.	42 dB	28.5
Notes: **applied calculation: SWL-10 〖log_10 [2 π(distance)^2] where SWL is the sound power level.* *** applied Method ISO 9613-2* *Considering that construction activities will take place during daylight hours, the noise limits for night-time have not been considered.*			

Table 10-4: Construction Works Noise Assessment – installation of panels and groundworks for the entire site.

Phase	Sound Power Level at Source (BS5228:2014)	Noise Level at NSR* (assumed 300m distance)	Noise Level at NSR (assumed 300m distance) considering attenuation**
Ground preparation.	Dumper truck 118 dB SWL. Backhoe excavator 99 dB SWL.	60 dB	53.9 dB
Installation of panels	Driven piling 103 dB SWL.	45 dB	38.9 dB
Notes: **applied calculation: SWL-10 ⟦log_10 [2 π(distance)^2] where SWL is the sound power level.* *** applied Method ISO 9613-2* *Considering that construction activities will take place during daylight hours, the noise limits for night-time have not been considered.*			

Based on the results above, it is expected that the Project will generally meet national/IFC noise limits (daytime) set for residential areas; however, ground preparation works have the potential to result in increased noise levels at 300 m distance with an exceedance 13.9 dB over the national limits (residential area). National limits are met at a distance of 800 m (39.5 dB(A)) from the sound source. It is considered however that ground preparation works are considered to be short term, temporary and intermittent in nature.

The noise impact due to construction works at site on nearest sensitive receptors is considered to be of **moderate** significance. Construction noise can often be mitigated through best practice, e.g., correct working procedures and working during appropriate times of day, regular maintenance of equipment / plant and planning activities in consultation with local stakeholders.

Access Road and Traffic

In addition to machinery and equipment, different types of vehicles (LGVs and HGVs in particular as defined in Chapter 2: Project Description) are expected to be used during construction phase of the Project. Furthermore, the Qobustan access road is expected to be subject to upgrades for approximately 7 km.

The Qobustan access road crosses a very sparsely populated area, and no sensitive receptors are present close to the Qobustan road works. This includes a buffer area of 100 m either side of the road (area of influence defined within Section 4.1 of the ESIA).

As such, the potential for significant noise impact to arise from the construction vehicles and Qobustan access road upgrade activities are considered to be **Negligible**. Road transportation from outside the country will take place approaching Qobustan settlement from Baku or Poti (Georgia) by main M2 highway. Given the nature of the Baku-Alat-Yevlakh-Georgian border M2 Highway – State Road as a major country arterial road, it is considered that Project's activities will not impact existing noise levels along the main highway.

10.4.1.1 Vibration

Truck and vehicle traffic along main transport/access routes and construction equipment and machinery would have the potential to induce ground borne vibrations. Given the nature of the Project and construction works to be done, not implying major civil works, it is expected that the Project activities during construction will not give rise to high levels of ground borne vibration. Bases on other similar projects, typically the levels of ground borne vibration from a heavy machinery are considered as imperceptible to humans at a distance of approximately 20 m. As the closest human receptors to the construction works are at a distance of approximately 1km, resulting levels of ground borne vibration will be imperceptible to occupants.

It is noted that there is an ancient cemetery, still used for funeral practices, located close to the southern Project boundary and the access road. It is not expected that the traffic along this road would result in unacceptable vibration impacts however mitigation will be in place including prior warning to local communities of any extensive traffic movements and construction works. Timing of works will be planned where possible to avoid sensitive times when the cemetery is in use. These are detailed in Section 10.5.1.

The construction of a new level road surface at Qobustan road, which will be adequately maintained, will ensure that ground borne vibration from vehicle movements will be negligible. Road passing vehicles are not anticipated to generate any significant level of ground borne vibration during construction even considering that no sensitive receptor are present close to the works along the road and buffer area of 100 m either side of the road.

10.4.2 Operational Noise

Solar PV panels themselves are not considered a noise source during operation, however equipment within the site (typically inverter stations and transformers) will emit noise during operation. While the Project will only be operational during daylight hours, as the transformers are permanently energised, they may emit some noise by way of magnetostriction hum during night-time. The distance between the substation and the nearest receptor (farming area) is approximately 1 km.

For the purposes of this assessment, it is assumed that the substation transformer is the dominant source of noise, and following assumptions have been considered:

- The sound power level of a substation power transformer between 60 to 80 dB(A). It is assumed 80 dB(A) as worst-case scenario for the purpose of the current assessment, without forced cooling as oil natural, air natural or ONAN cooled;
- Assuming a clean 50 Hz supply, the critical frequency will be in the 125 Hz octave band.

At 75 m distance, the attenuation, according to ISO 9613-2 and assuming temperature of 20°C, 70% relative humidity, and soft ground between source and receiver (ground absorption assumed G = 1), is expected to be 48.5 dB ref 20 µPa/pW. Assuming a substation power transformer sound power level of 80 dB(A) as worst-case scenario, the sound pressure level at 75 m is expected to be 31.5 dB(A).

Considering that the nearest sensitive receptor is located at approximately 1 km in distance from substation, it is considered that National and IFC daytime and night-time limits will be met at all NSRs. As such, the potential noise impact during operation is considered to be of **Negligible** significance.

10.5 Mitigation

Mitigation principles identified below align with the relevant IFC Performance Standard (PS 3 - Resource Efficiency and Pollution Prevention).

IFC PS 3 seeks to avoid or minimize adverse impacts on human health and the environment by avoiding or minimising pollution from Project activities.

10.5.1 Construction

In order to reduce the impact of noise during construction, best practicable means will be followed to ensure that the quietest available plant and construction techniques will be used in order to limit noise output as far as practically possible. Construction will only be undertaken during daytime hours. Where appropriate, micrositing will be undertaken to ensure construction noise impacts are minimised and equipment is located as far as possible from NSRs taking advantage of the natural topography as a noise buffer during facility design.

To reduce the potential for road-related vibration impacts, mitigation will be included in the TTMP and will include adherence to low-speed limits and regular maintenance of vehicles utilising the road during construction. Monitoring will be in place to ensure adherence to these measures.

In addition, all machinery used on the Project site will be regularly maintained and a TTMP in place to regulate traffic and machinery use. Project construction traffic routing through community areas outside defined Project access road will be avoided.

Consultation will take place with local communities prior to construction to inform people of the proposed schedule and prior to any significant deliveries / HGV movements to the Project site during construction.

There is a small amount of worker accommodation required on the Project site (for housing up to 30 people). The location of this accommodation is not known at present and so the results of this noise assessment will assist in informing the location away from noisy areas of the Project site during construction. Monitoring of noise levels at the accommodation should be conducted during construction of the Project.

10.5.2 Operation

Should additional mitigation be required during the operational phase, the following will be considered:

- Installation of acoustic enclosures for equipment causing radiating noise (this would typically give 3 dB attenuation).
- Installing acoustic barriers without gaps and with a continuous minimum surface density of 10 kg/m^2 in order to minimize the transmission of sound through the barrier. Barriers to be located as close to the source or to the receptor location to be effective.

- Periodical maintenance of plant components such as inverters, transformers and other equipment and vehicles used for transportation to and from the site will be carried out to ensure their good working conditions.

To reduce the potential for road-related vibration impacts, mitigation will be included in the operational EMP and will include adherence to low-speed limits and regular maintenance of vehicles utilising the road during operation.

In addition, the Project grievance mechanism developed under IFC PS 1 will be implemented during both the construction and operational Project phases. This will be utilised to record, monitor and respond to / mitigate any noise related impacts raised by nearby farmers and ensure compliance with noise limits is achieved at NSRs.

10.6 Residual Effects and Conclusions

There will be a short-term noise impact on NSRs during the construction phase. However, best practise construction methods will be followed to ensure that noise impacts are reduced where possible. Construction activities will not be carried out during noise sensitive hours such as evenings. With suitable management, no significant impacts are predicted on nearby NSRs.

11 Transport and Access

11.1 Introduction

This Chapter presents the assessment of impacts potentially generated on the road infrastructure by the Project's development. It also includes a description of the proposed access route to the site and the current road network status and safety in Azerbaijan, with a focus on the Project site surroundings. Where required, appropriate mitigation measures are outlined, and any resultant residual effects assessed.

11.2 Assessment Methodology

11.2.1 Baseline Data Collection

A desktop review and site visits undertaken in July 2020 and April 2021 have been executed to identify any key issues in accessing the site and to consider potentially suitable access routes from main roads. This high-level route assessment has been largely based on existing maps, satellite imagery, and information gathered during the site visits. There has also been an initial logistics study carried out by DEC.

11.2.2 Assessment of Impacts

The assessment of impacts potentially generated by the Project on traffic flows has been carried out by considering different types of vehicles involved during the construction phase (i.e., Light Goods Vehicles, LGVs; Heavy Goods Vehicles, HGVs; Abnormal loads) and by applying the IEMA (2003) "Guidelines for the Environmental Assessment of Road Traffic". The guidelines suggest the following thresholds are adopted to assess network features are to be subject to assessment:

- Rule 1 – Include highway links where traffic flows will increase by more than 30% (or number of HGVs increasing by more than 30%).
- Rule 2 – Include any other specifically sensitive areas where traffic flows will increase by 10 % or more.

The specific impact assessment methodology applied to evaluate impact significance on transport and access is discussed in detail in the following paragraphs.

11.2.2.1 Receptor Sensitivity

The sensitivity of roads, their users and settlements along the proposed route has been assessed in accordance with the criteria set out in Table 11-1. The IEMA guidance[46] details that sensitive locations are defined as receptors that are sensitive to traffic including amenities such as hospitals, places of worship, schools and historic buildings.

Table 11-1: Sensitivity Criteria

Sensitivity	Criteria
High	Large rural settlement containing numerous amenities. Traffic management measures in place such as controlled crossings, signalled junctions etc. Minor / unclassified unpaved roads with low traffic flow volumes. These may not be suitable for large HGV vehicles.
Medium	Rural settlement with a number of amenities. Minor traffic management measures in place. Local road (paved / unpaved) suitable for HGV traffic.
Low	Small rural settlement with few local amenities. Minimal traffic management measures in place. Paved road capable of large volumes of HGV traffic.
Negligible	Scattered dwellings with no local amenities. No / little traffic management in place. Highway suitable for all types of vehicles and volumes.

11.2.2.2 Impact Magnitude

The magnitude of impact on traffic flow is determined based on criteria set out in the IEMA guidelines and reported in Table 11-2 below.

[46] IEMA (1993), Guidelines on the Environmental Assessment of Road Traffic

Table 11-2: Magnitude of Change Criteria

Magnitude of Change	Increase in Traffic Flow	Increase in HGVs
Large	Above 90%	Above 90%
Medium	Between 60% and 90%	Between 60% and 90%
Small	Between 30% and 60%	Between 30% and 60%
Negligible	Under 30%	Under 30%

11.2.2.3 Impact Significance

Given the above, a combined assessment of sensitivity and magnitude has been made to determine the level of the predicted effect on a receptor (i.e. Negligible, Minor, Moderate or Major). All direct and indirect impacts causing Moderate or Major effects, as identified within Table 11-3, are considered to be significant.

Table 11-3: Matrix for Assessing Level of Effect

Magnitude of Change / Impact Significance	Sensitivity			
	Negligible	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Small	Negligible	Negligible	Minor	Minor
Medium	Negligible	Minor	Moderate	Moderate
Large	Negligible	Minor	Moderate	Major

11.3 Baseline Conditions

11.3.1 Transportation Network

11.3.1.1 Roads

Azerbaijan's inland transport modal split has heavily shifted to road in the last decade, representing 71% of freight transport and 98% of passenger transport in 2015.

Road ownership in Azerbaijan is divided into state, municipal, and private roads. State roads, owned by AzerRoadService (ARS), are divided into three classes: major arterial roads (M), minor arterial roads (R), and collector and local roads. The M and R roads represent around 27% of the ARS road network but carry over 90% of the traffic. The average daily traffic is approximately 5,100 vehicles per day on the M roads and 2,200 vehicles per day on the R roads.

Except for M roads which can have from two to six lanes, all other roads have only two lanes. Only 54% of the total ARS network, including all M and R roads and around 37% of Y roads, is paved. The condition of internal roads in the country is generally poor due to the quality of construction and materials used, and the lack of regular preventive maintenance after road construction and rehabilitation. Some local roads are impassable during winter, which means that rural communities lack access to services for several months of the year[47].

Table 11-4 below presents the length and the republic/local relevance of different motorways types, based on data reported in Azerbaijan's Statistical Yearbook 2020.

Table 11-4: Length and republic/local value of motorways' type in Azerbaijan[48]

	Highway	Hard pavement	Concrete	Asphalt-concrete	Gravel	Earth road	Other
Republic Importance (km)	4,789	4,783	121	4,532	36	94	6
Local Importance (km)	14,387	14,281	4	6,772	6,494	1,011	106
Total (km)	19,176	19,064	125	11,304	6,530	1,105	112

According to the urban planning rules (Urban planning and highways, planning and development of urban and rural settlements), the roads and streets of rural settlements

belong to different categories:

- Main streets of 3.5 m width, including from 2 to 4 lanes, passing through the entire territory of the rural settlement, and providing the main transport and pedestrian connections, as well as the connection of the residential area with the community center.
- Local streets of 3.0 m width, including two lanes providing connection between residential buildings and main streets.
- Local roads of 2.75 m width, including two lanes serving the industrial areas and providing connections with residential areas.
- Driveways of 4.5 m width, including one lane providing direct access to residential, industrial, and public buildings.

There are issues relating to the quality of internal roads and public transports in both Alyat and Gobustan settlements. Some local roads in these municipalities are not paved nor lit. Asphalting and lighting works conducted by Baku Landscaping Department are currently underway on some local roads in Gobustan settlement, and roadside greening works are planned to be carried out in Alyat. Works on improvement of the road infrastructure in the Alyat and Gobustan settlements is carried out in accordance with the State Program on the socio-economic development of the regions of Azerbaijan (2020-2023). The Program provides for specific measures and terms to improve the infrastructure in each district and its settlements, including the road infrastructure of rural and settlement streets and transport links. Relevant authorities (Ministry of Economy, executive authorities of districts and cities, etc.) regularly monitor the implementation of the State Program and report to the Government.

[47] Improving the Sustainability of Road Management and Financing in Azerbaijan - World Bank, 2011.

[48] Statistical Yearbook "Transport in Azerbaijan" - State Statistical Committee of the Republic of Azerbaijan, 2020.

Road Safety

Based on the outcomes of the Systematic Country Diagnostic developed by World Bank in 2015[49], poor connectivity in regions and rural areas constitutes a major constraint in Azerbaijan. Despite the considerable progress undertaken over the period 2005-2015 in improving the main road network, about 80% of local roads remain in bad condition, and more than half of local roads requires urgent repair and rehabilitation.

Investment in infrastructure, in particular regional and local roads in areas with vulnerable populations, was identified as a key emerging priority by World Bank, as poor local connectivity also influences the ability of basic social services to be delivered as well as the demand for education and health services. However, Azerbaijan's investment projects in the roads sector are mainly focused on expanding or rehabilitating highways, which are important in order to further strengthen the country's geographical position as an important link between the Black and Caspian seas and between Russia and Iran. Cross-border connectivity projects are top priorities for the Government and make up most of Azerbaijan's transport investments[50].

In recent years Azerbaijan's per capita spending on transport infrastructure has declined. Road infrastructure investments dominate government spending on transport infrastructure, while inland waterway transport infrastructure remains of significant but secondary importance (Figure 11-1).

[49] Azerbaijan Systematic Country Diagnostic - Management Unit (ECCU3), World Bank Group, June 2015.

[50] Sustainable Infrastructure for Low-Carbon Development in Central Asia and the Caucasus, Hotspot Analysis and Needs Assessment - OECD, December 2019.

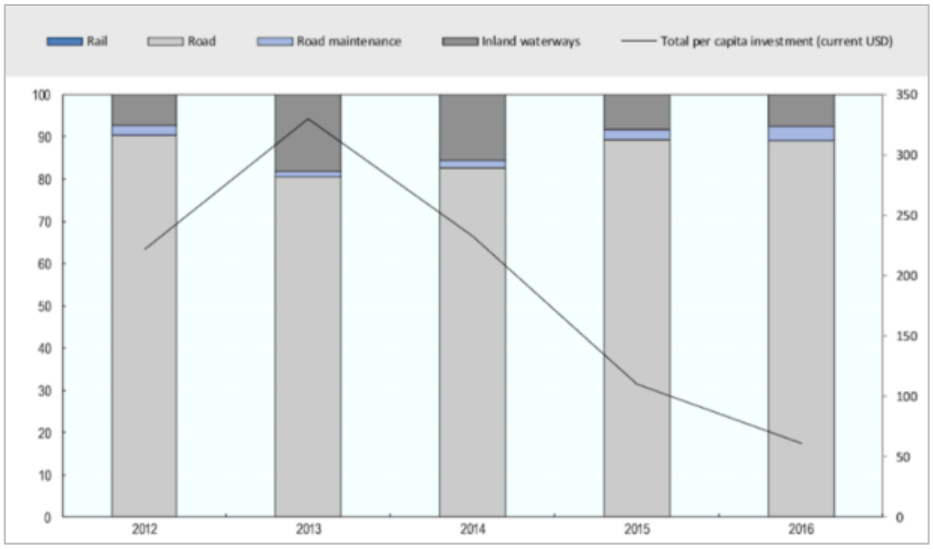


Figure 11-1: Inland transport infrastructure investment in Azerbaijan (2012-2016)[50]

Based on data reported in Azerbaijan's Statistical Yearbook 2020[48], the number of road traffic accidents accounted for a total of n.1,870 cases in 2019, 88% of which occurred in built-up areas and the remaining 12% on motorways.

The 96% of road traffic accidents occurring in 2019 happened on dry road surfaces, thus only the remaining 4% occurred in presence of particular road conditions, such as wet or iced roads. Among these events, 44% represents accidents between pedestrians and vehicles, 34% corresponds to accidents between vehicles, and 22% represents single-vehicle accidents. These events killed a total of n.821 people and injured a total of 1,702 people, 70% of which were aged 25-64.

11.3.1.2 Railway

Azerbaijan Railway (ADDY) is a state-owned enterprise that operates under the direction of the Ministry of Transport of the Republic of Azerbaijan. The main railway route consists of a west – east link from the Black Sea ports of Georgia and the Georgian capital Tbilisi to Baku on the Caspian Sea, where there are connections to train ferries operating to Aktau in Kazakhstan and Turkmenbashi in Turkmenistan.

There is also a north - south link operating from the Russian border near Makhachkala to the Iranian border at Astara, and an east-west line linking Baku to Nakhitchevan. In addition, there are a number of small branch lines radiating from the main routes and an intensive rail network in the Absheron peninsula surrounding Baku.

The main railway line to Georgia runs parallel to the M-2. Total length of main track is

2,932 km, and its operating length is 2140 km. Of this, 1,169 km are electrified while the rest operated by diesel-electric locomotives.

The railway line is predominantly used for freight purposes, though a small number of passenger services connect towns to Baku and Georgia. Freight traffic has been increasing continuously in the last decades, even if from 2015 to 2019 there has been a decrease of freight turnover and good transportation (respectively from 6,210 to 5,152 million tonne-km and from 17,090 to 15,222 thousand tonnes); most of the operations are on the Trans-Caucasian line through Azerbaijan and Georgia.

The improvement of the Azerbaijan Railways network has been appraised by the Government of Azerbaijan as one of the economic development factors for the country. The priority corridor is the Trans-Caucasian line, where traffic has been and is increasing most rapidly.

11.3.1.3 Baku International Port

Shipping activities in the waters of the Central Caspian Sea include cargo shipping, passenger vessels, scientific surveys and other vessel movements supporting the oil and gas industry. Baku is a main international port on the Caspian Sea which is seen as a strategic part of Azerbaijan's logistics infrastructure and a key point in the whole logistics corridor through which mineral, commodity and other products pass from central Asia to western markets. The port has been constantly developing and plays an important role in trans - Caspian trade and is the main marine gateway to Azerbaijan. The port operates year-round and as a vital transit point in Europe-Asia trade.

The Baku International Sea Trade Port is comprised of Main Cargo Terminal, Dubendy Oil Terminal, Ferry Terminal and Passenger Terminal. The major trading partners are Ports of Aktau (Kazakhstan), Turkmenbashi (Turkmenistan), and Olya (Russia). Cargo and passenger ferries operate between Baku/Alat and Aktau and between Baku/Alat and Turkmenbashi; and between Olya and Turkmenbashi. The majority of transit is from East to West and it primarily consists of oil and oil related products from Kazakhstan and Turkmenistan. The bulk of exports go to Port of Turkmenbashy and a smaller portion goes to Port of Aktau.

The Baku International Sea Trade Port (BISTP) in Alyat is a new port located around 70 km south of Azerbaijan’s capital. It is an extension of the Baku port and claims to link Turkey, the European Union, Iran, India, and Russia with three international rail lines. Distance from BISTP to existing rail and road network is less than 5 km. Thus, the port design offers a 0.5 km connection to an industrial railway line, as well as highway access through 3 km

road connections to the North-South and East-West main roads (Motorways). The first phase of the port's construction was completed in 2017, but the timeline for phases two and three are contingent on initial cargo volumes. With improved Caspian Sea shipping and port services, the BISTP has the potential to be a major node linking Europe to Asia.

11.3.2 Transportation of solar PV components to Azerbaijan and Project Site

The Company is in process of running a competitive EPC tender and transportation will be led by EPCs. For time being both land and water transport is considered. Two proposals are under evaluation:

- One option is proposed by SEPCO III utilizing ports from Shanghai to Poti (Georgia) and thereafter road transport. The duration of shipment from Shanghai port to Poti port is about 29 days normally. A group of trailers will be responsible for inland transportation from Poti to the Project site after customs clearance. The distance between Poti and is the Project site is around 841 km by M2 highway. The duration for inland transportation is about 14 days normally. Access to site is then expected through Qobustan road.
- Second option is proposed by METKA which considers rail and road transport. Transportation will take place mainly by rail for the bulk items that are arriving from China (PV Modules, Tracker Parts, Inverters and Production Substations – more than 2.500 containers passing by Shanghai/ Tianjin/ Hefei - Xi'an/Jinan/ Jiaozhou - Horgos – Aktau – Baku, arriving then in Gobustan area by truck) and by road from Europe (Greece, Romania and Italy) for cables, LV Panels, SCADA and CCTV/Security Equipment.

Road Transportation from all European places of origin will take place through Turkey and Georgia to Azerbaijan (approaching the Project site by main M2 highway and Qobustan road). Access to site is then expected through Qobustan road.

11.3.2.1 Access to the Project Site

Access to the Project site will be gained via a main gate located in the north-eastern corner of the fence surrounding the Solar PV plant area, while equipment transportation over the Project area will be provided through a road surrounding the field and a network of internal roads.

As shown in Figure 11-2, transportation to the Project site will be provided through an existing track (Qobustan Road) to be upgraded and paved in various sections. The access road is a Project facility and is under the responsibility of EPC Contractor. This is the main route to access the Project site from Qobustan city and directly connects to M2 Road. The proposed route from Baku or Poti (Georgia) to the Project site comprises the following existing key roads:

- **Main Highway "M2"**, from Baku or Poti to the entrance to the Qobustan settlement.
- **Qobustan Road**, from the Qobustan settlement to the Project site, which is subdivided between:
    - a dual carriageway local road of approx. 3 km length, which is an asphalt road running from the Qobustan settlement to the entrance of the Qobustan National Park and Reserve – picture "A" in Figure 11-3; and
    - a local dirt road of approx. 7 km length, which is a 4th category dirt road without special coating running from the entrance of Qobustan Reserve to the Project site, passing through the junction to GOC (Gobustan Operating Company) base – pictures "B, C and D" in Figure 11-3.

As shown with the blue dotted line in Figure 11-2 and Figure 11-3. the first part of the above-mentioned unpaved road (1.2 km in length) overlaps with a new road namely "Gobustan – Volcanoes". According to press and TV reports[51], the Agency of Roads of Azerbaijan Republic has begun construction/revamping works of this new highway as part of the State Program for the socio-economic development of regions (2020-2023).

[51] https://az.sputniknews.ru/economy/20210403/426608226/azerbaijan-absheron-grazevie-vulkany-novaja-doroga.html; http://www.aayda.gov.az/az/news/2943.

This new asphalt concrete coating road will be 8 m wide and 21 km long, leading from the Gobustan settlement to the mud volcanoes located to the north-west of the Project site (picture "E" in Figure 11-3). The main purpose of the new road is to improve the transport infrastructure within the Garadagh District and facilitate access for the local population and tourists to a future tourist complex, which will be built in the area within the Arabani mud volcanoes, approx. 12 km from the Project site.

As shown in Figure 11-3 and Figure 11-4, a 15-km section of the road has already been built and prepared for asphalt-concrete paving. Considering the actual pace of construction works, it is expected that the new road will be completed before the commencement of Project activities.

A broader description of the above-mentioned road infrastructures which will be utilised to access the Project site is reported in the following dedicated sub-sections. It should be noted that during site visits undertaken in April 2021, several vehicles were seen using the Project site and its vicinity for transporting animals and driving livestock. These vehicles use several dirt roads crossing the site in all directions, which are the only roads connecting the existing farms spreading in the vicinity of the Project area with the outside.

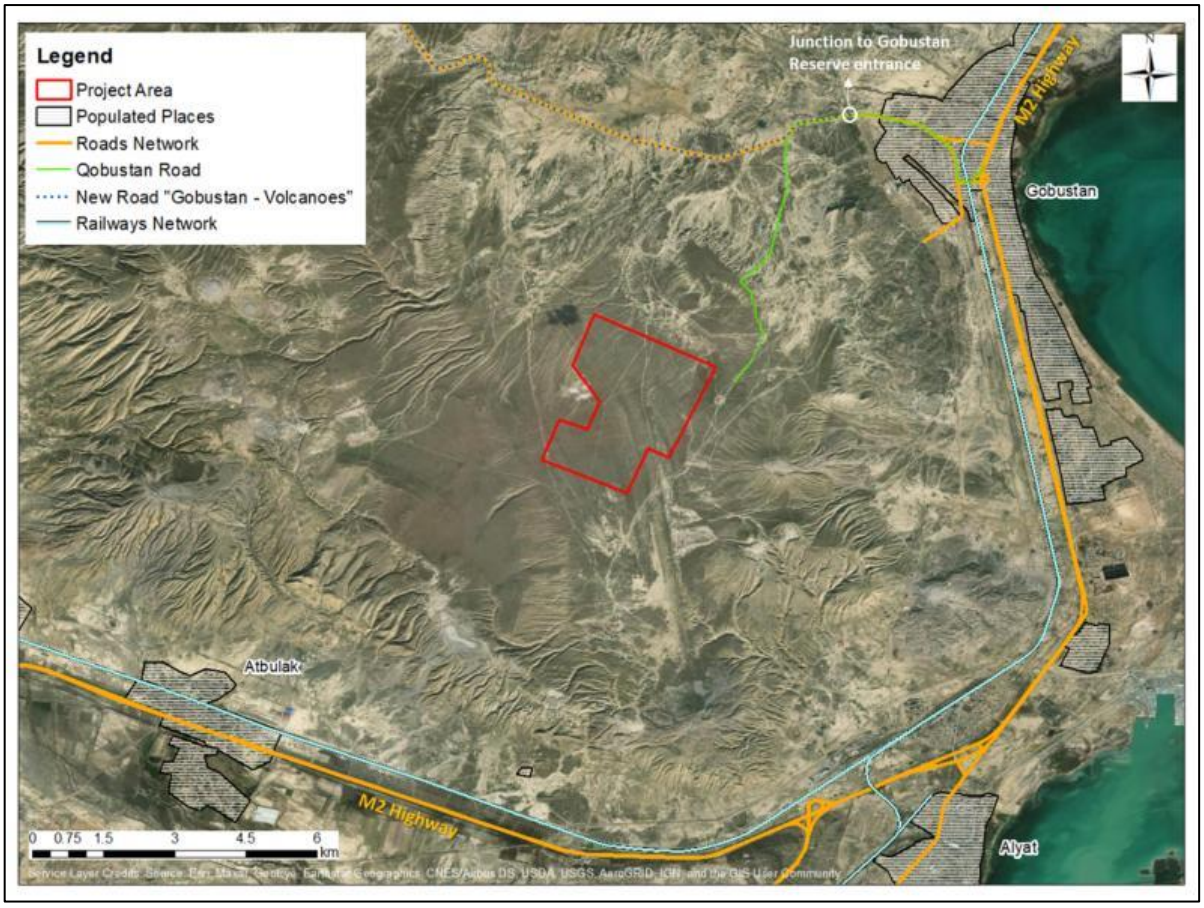


Figure 11-2: Roads network in the vicinity of the Project Area providing access to the site

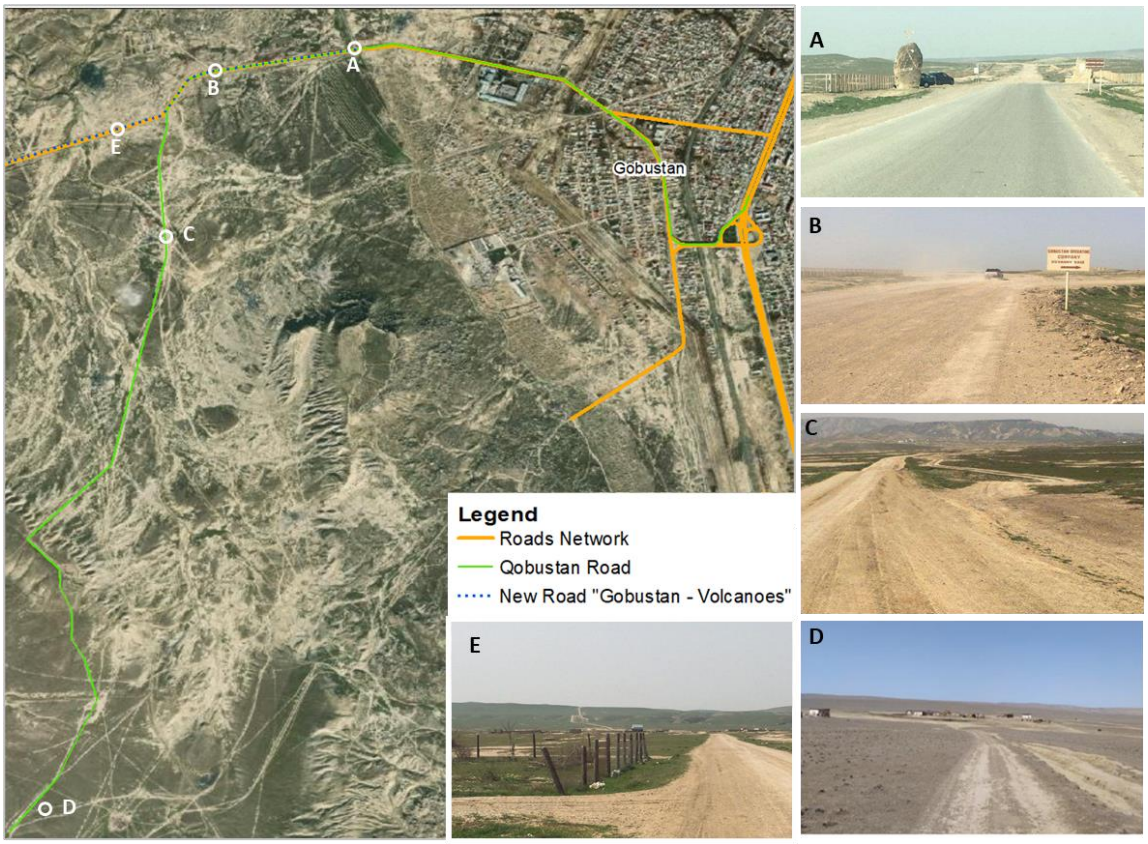


Figure 11-3: Pictures of the roads in the vicinity of the Project site

Figure 11-4: Ongoing construction works of the new road "Gobustan – Volcanoes

M2 Highway – From Baku to Gobustan settlement

The Baku-Alat-Yevlakh-Georgian border road (M2 Highway – State Road) is a major arterial road from Baku or Poti (Georgia) to the entrance to the Qobustan settlement. As shown in Figure 11-5 below, M2 highway is a well-maintained major arterial road of approximately 500 km length, running at around 5-7 km distance from the Eastern and the Southern boundary of the Project Area. The M2 is an East-West corridor, starting from Baku, spreading along the coast to Alat, and then crossing the country following the East-West direction, till reaching the border of Georgia.

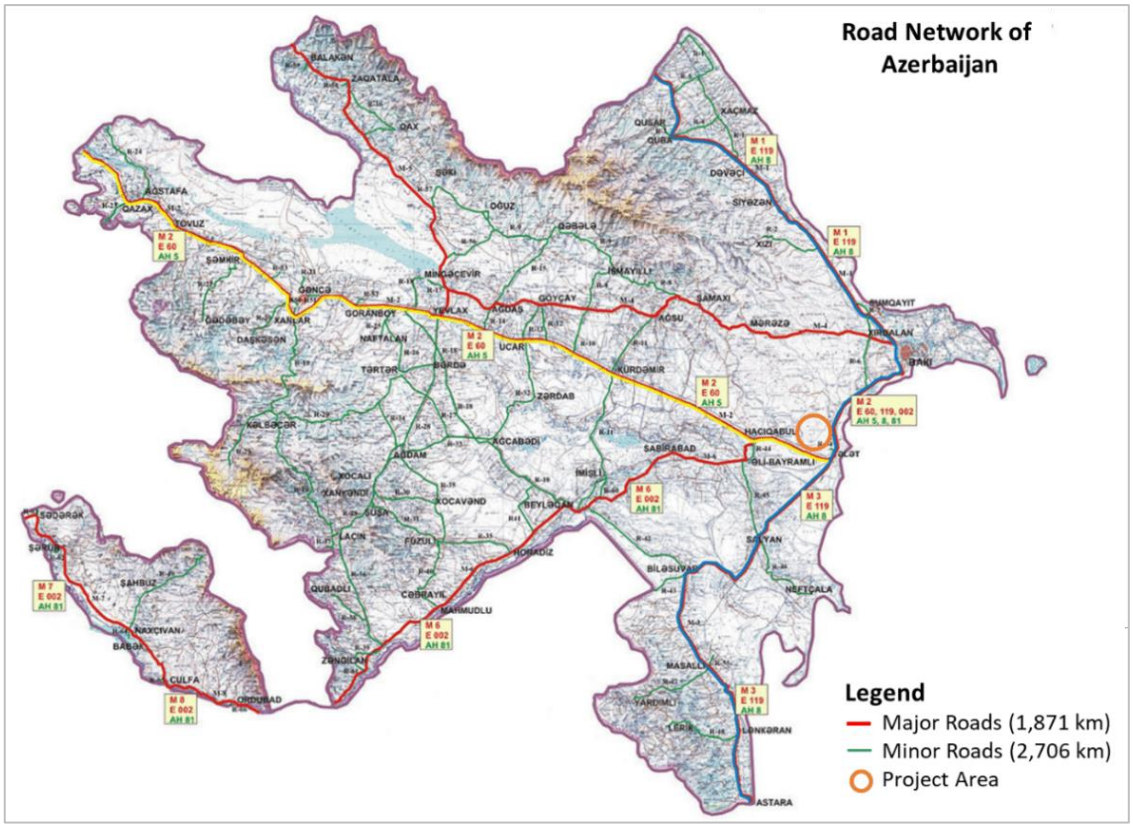


Figure 11-5: Road network of Azerbaijan

The M2 is part of the Great Silk Road, the main Baku-Tbilisi route, and of the Transport Corridor Europe-Caucasus-Asia (TRACECA) route E-60, which is a main corridor between Western Europe and China[47].

According to the Azerbaijan Statistical Yearbook 2020, goods transported on TRACECA kept almost constant over the period 2015-2019, accounting for around 52-53 million tonnes per year; 65.6% of these goods were transported by roads, 25.3% by railways, and the remaining 9.1% by sea (Figure 11-6). These percentages also reflect goods' transportation methods applied over the country, as around 70% of goods were transported on roads in 2019, while the remaining 30% was subdivided between sea, railways and pipelines transporting ways.

Based on publicly available national statistics on traffic, 67 million tons of goods and 754 million of passengers have been transported by road network in Baku District area in 2019[52].

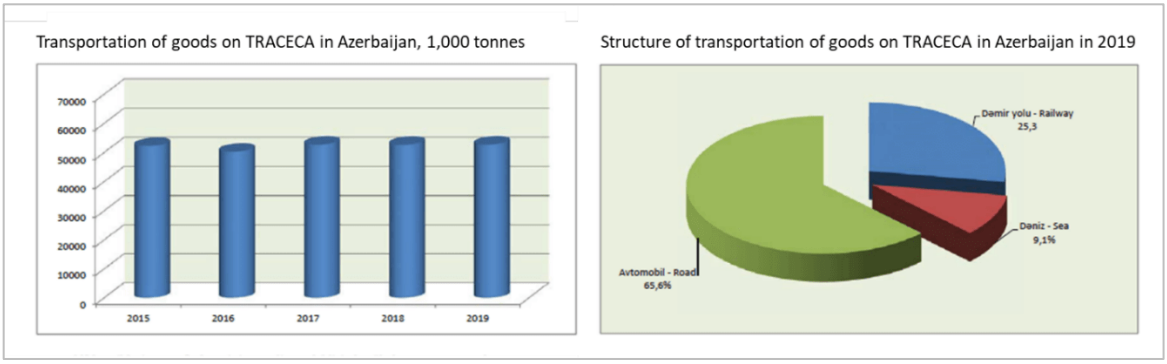


Figure 11-6: Quantities of goods transported on TRACECA in Azerbaijan over the period 2015-2019 (left), and related structure of goods' transportation in 2019 (right)[48]

Qobustan Road – Asphalt Section

The Qobustan road asphalt section, running from the Qobustan settlement to the Qobustan National Park and Reserve, is a dual carriageway asphalt road of approx. 3 km length with destroyed pavement over some sections.

This is a central street within the Gobustan settlement subject to high traffic intensity due to the transit of large number of cars and trucks owned by the local residents and various departments.

This section of Qobustan road is expected to be upgraded where needed before the commencement of Project activities.

Qobustan Road – Dirt Section

The dirt road running from the entrance of Qobustan Reserve to the Project site is an earth road of approx. 7 km length, which does not provide year-round access for local farmers to nearby settlements, due to its poor-quality conditions.

Along this dirt road there are no road signs, gas stations, service stations, fire brigades and first-aid post, night lighting and evacuation services; mobile communications are also very unstable due to the difficult terrain.

[52] https://www.azstat.org/webmap/ - State Statistical Committee of the Republic of Azerbaijan.

Given the current conditions of the Qobustan road's unpaved section, which will provide direct access to the Project site, the Project Proponent is expected to put in place revamping and paving operations before the commencement of Project activities, in order to allow transportation of heavy equipment such as the transformers, water trucks, etc.

11.3.2.2 Site Visit Observations

Due to accessibility issues, three alternative roads running from Gobustan settlement to the Project site have been used during the site visits executed in April 2021. All the three alternative routes run through the rural area of interest up to the Project site. The impact assessment has been based on the assumptions that the Project will only use the Qobustan Road as temporary construction and operational access road to the Solar PV site as reported in the Project Description Chapter 2 of the ESIA.

The observed conditions of these alternative access roads identified during the site visits are briefly discussed below with reference to Figure 11-7.

1. Alternative Road N.1 is characterized by lower traffic intensity with respect to the other considered routes and can be conditionally divided into the following several sections:
    - between points 1 and 2 is an asphalt road;
    - between points 2 and 3 is a dirt road;
    - between points 3 and 4 is the operational dirt road running along the entire route of the GOC "Babek-Umid" underground gas pipeline; and
    - between points 4 and 5 is an ordinary unpaved dirt road.
2. Alternative Road N.2 starts from the intersection with the new road "Gobustan - Volcanoes" and can be divided into the following sections:
    - between points 1 and 2 is an operational dirt road with improved coating running along the entire route of the GOC "Babek-Umid" underground gas pipeline; and
    - between points 2 and 3 is an ordinary unpaved dirt road.
3. Alternative Road N.3 starts from the intersection with the new road "Gobustan - Volcanoes" and is an ordinary unpaved dirt road (section between points 3 and 4).

As anticipated, alternative roads n.1 and n.2 partially overlap with the maintenance road built along the "Babek-Umid" underground gas pipeline owned by the GOC, which runs approximately 1.0-3.0 km East to the Project site. This narrow operational road with improved surfacing passes through hills, steep slopes, and descents in some places, which cannot guarantee both the safe delivery of goods and road safety. In case of rainy weather, this road becomes impassable, slippery, and dangerous due to the lack of hard surfacing (gravel, crushed stone, etc.). In addition, the builders of the gas pipeline left the excess soil resulting from backfilling operations of the pipeline trench along the edges of the road, thus creating an extended high terrain embankment in some places.

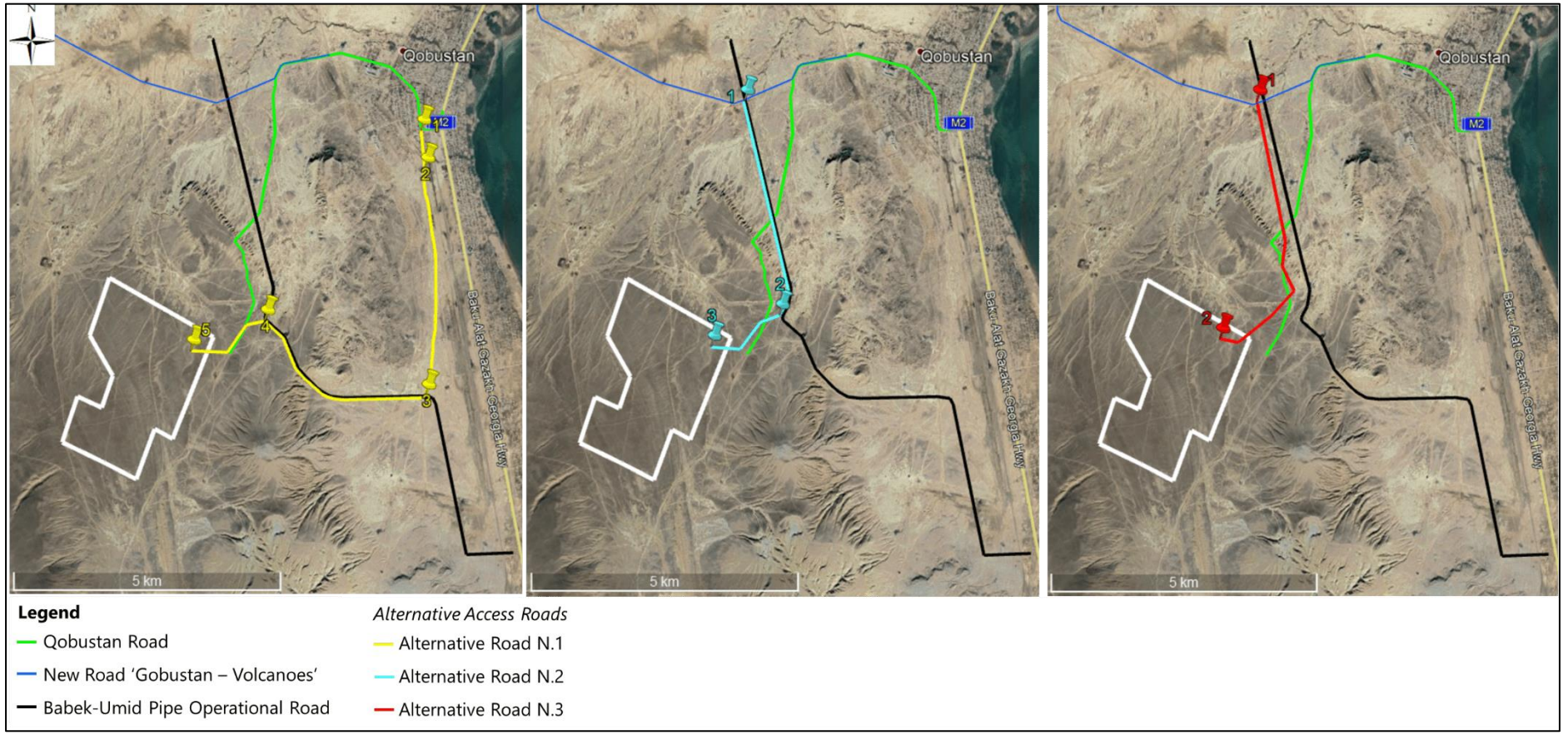


Figure 11-7: Alternative routes to access the Project site based on the outcomes of the site visit performed in April 2021

11.4 Assessment of Impacts

11.4.1 Roads Sensitivity Analysis

Table 11-5 sets out the level of sensitivity of the different sections of roads along the proposed route considering the current type of road, traffic volumes and the presence of any sensitive receptors.

Table 11-5: Road Sensitivity Analysis

Road	Receptor Details	Sensitivity
M2 Highway	• Paved multi-lane highway with high carrying capacity and high daily traffic flows, in good condition. • Primarily passing industrial/commercial areas. • Free of charge road. • Highway suitable for all types of vehicles and volumes.	Negligible
Qobustan access road – Section from Qobustan settlement to Qobustan National Reserve. (approx. 3 km long)	• Paved dual carriageway road with moderate daily traffic flows and destroyed pavement occurring over some sections. • Passing residential and commercial areas. • Minor traffic management measures in place. • Road suitable for HGVs.	Medium
Qobustan access road – Section from the Qobustan National Reserve to the Project site. (approx. 7 km long)	• Local dirt road of poor quality with low daily traffic flows. • Passing rural areas. • No / little traffic management in place. • Minor / unclassified unpaved roads with low traffic flow volumes. These may not be suitable for large HGV vehicles.	High

11.4.2 Impact Significance Evaluation

The following table reports an overview of general risks potentially occurring on traffic flows in Azerbaijan. The evaluation of the significance of impacts potentially arising from the Project development is discussed in the following sub-sections, with reference to each project phase.

Table 11-6: Traffic risks on the roads of Azerbaijan

Category	Risk
Road risks	• Rough road surface • Narrow side streets / poor visibility • Lack of clear road junctions • Poor condition of road equipment, signs and handrails • Unfit road signs indicating the direction • Unfit warning signs for road works and temporary reverse flow systems
Transport risks	• Overloaded / defective cars • Low-speed cars (e.g., road repair vehicles, agricultural vehicles) • Vehicles' headlights and taillights unfitting driving at night
Risks related to driver behavior	• Inexperienced or untrained drivers • Drunk, extremely tired, or distracted drivers • Overall poor driving standards
Other risks	• Uncontrolled roads' crossing of herds, cattle, sheep, and goats • Livestock left alone on the road at night • Pillars of construction materials temporarily built on the road

11.4.2.1 Construction

A TTMP will be finalized during the detail design stage. For both options reported in section 11.3.2.1, construction equipment and workforce will travel to the site by road in country, and will, therefore, have an impact on local traffic and transportation.

During the first period of construction in particular, there will be delivery of equipment to site and vehicles / machinery transported to the site for construction activities. The second phase will involve set up and commissioning of all infrastructure and as such, this stage will have reduced vehicle requirements.

The assessment of impacts potentially resulting from the Project on transportation and access during the construction phase is limited to the expected number of HGVs movements, and construction staff transportation requirements that will be carried out by LGVs. Movements of any abnormal loads or specialist vehicles (bulldozers, cranes etc) to the Project site are expected to be limited. Very less heavy load other than major equipment's (transformer, inverter-stations etc) are expected. The requirement for any oversized vehicles/abnormal loads will be considered at final design stage from EPC contractors to ensure access is appropriate.

The impact assessment discussed herein has been developed based on the following assumptions:

- The PV Solar plant will be constructed as one development rather than in a phased approach. The construction phase will commence in Q2 2022 and will last up to 18 months.
- The Solar PV components and construction equipment will be transported in country over land through M2 and Qobustan road, an existing track to be upgraded and paved in some sections to allow transportation of heavy equipment. This is the main route to reach the Project site from Qobustan city and directly connects to M2 Highway (refer to Section 11.3.2 for further details).
- Up to 1,600 LGVs and 10,000 HGVs total vehicle movements have been estimated during construction based on previous solar PV experience and information provided on the Project. Abnormal loads are expected to be very limited in number – if needed.

Effects on the Road Network

During construction phase, traffic is expected to increase to a certain degree due to the nature of activities that will take place, such as the transport of equipment and materials to and from the site through the surrounding road network.

At this stage, the magnitude of the potential change induced by the Project construction phase on traffic numbers has been assessed qualitatively through site visit inspection, local consultant feedback and previous experience.

Normal traffic flow along the M2 Highway which will be used to reach the Project site will be maintained during the PV solar plant construction process, with likely some minor delays due to turning trucks and the presence of slow-moving vehicles. Most disruption is thus likely to occur at roads' junctions, however these impacts are to be considered minor and of short duration if properly managed.

Delivery of goods through the new road "Gobustan - Volcanoes" will lead to a temporary increase of traffic intensity on the section which will be used to reach the Project site, due to vehicles' "entry and exit" from the Gobustan settlement. Moreover, considering that the realization of a new tourist complex located approx. 12 km North-West from the Project site is foreseen, an increase in traffic intensity along the new road may be the expected with reference to the transit of construction vehicles and the subsequent influx of foreign and local tourists to the Gobustan nature reserve and volcanoes.

The overall level of effect is predicted to be **Moderate** as regards Qobustan road while **Negligible** for M2 Highway, as resulting from the following assessment of the magnitude of change and of the receptors' sensitivity:

- The magnitude of change associated with the Project generated traffic is likely to be Medium for Qobustan road, as the construction traffic is expected to involve a relatively large increase in traffic flows and in HGVs movements compared to levels observed during site visits.
- The magnitude of change associated with the Project generated traffic is likely to be Small for M2 Highway given the current high utilization of the road the extent of traffic generated due to the Project activities.
- The receptors' sensitivity can be considered of Medium to High for local Qobustan road, while Negligible for M2 Highway, as anticipated in Section 11.4.1.

The impact on the **local road network** is therefore anticipated to be **significant** during construction. Mitigation measures have been proposed to ensure that any impacts are limited.

Road works

The existing roads in the vicinity of the Project site are not suitable for vehicles carrying construction and plant material, therefore, Qobustan access road will be subject to upgrading operations. Damage to road edges and general 'wear and tear' of the road due to the increase generated in HGVs movements cannot however be excluded. At this stage, it is difficult to identify the extent to which this may occur; at worst and given the current road condition, the magnitude of change is likely to be of Medium level.

Considering that, as anticipated in Section 11.4.1, the Qobustan access road receptor sensitivity is of Medium to High level, it can be concluded that there would be an impact of **Moderate** significance, pre-mitigation.

Road safety

The Project construction activities will lead to additional traffic and increased risk of traffic-related accidents and injuries to the community and to workers. However, prior to mitigation, the addition of vehicles to the roads is expected to result in a **Minor** increase in the risk of traffic accidents on both local access road and highway.

Cross-Country Transportation Considerations

The Project-related vehicle movements, railway transport as well as marine vessel movements will use existing international shipping routes to and from the selected suppliers. Related potential impacts generated by those planned activities during the Construction Phase will typically be temporary in nature. However, defined mitigation strategies with a TTMP in place will mean that significant impacts on cross-country shipment do not have the potential to result in impacts that cross territorial borders and thus significant related environmental impacts are not anticipated.

Selecting an experienced supplier with suitable transport equipment will be fundamental. EPC contractor will prepare and implement the TTMP. This will include permitted routes to the site and traffic management requirements and audit plans to all sub-contractors and third-party suppliers to verify their eligibility to meet the E&S obligations prior to contracting as set out in TTMP and CEMP.

11.4.2.2 Operation

The main transport impacts will occur during the construction phase. The number of vehicles during operation is likely to be very low, with access required only for maintenance and servicing. The majority of these will be light vehicles and, at the worst case, an HGV trip may be required to transport a replacement transformer to site. The effects of traffic movements stemming from the operational phase are therefore considered **Negligible** and so insignificant.

11.4.2.3 Decommissioning

Decommissioning effects are likely to be similar to that during construction although reduced in magnitude. At this stage, it is not possible to quantify the traffic effect during decommissioning of the Project as it is considered to be too far in the future to estimate any baseline traffic flows. It is unlikely however to present any significant effects.

11.5 Mitigation Measures

It is recommended that the efficiency of deliveries of construction materials to the site is closely monitored and, if necessary, sufficient storage provision is made available on site to prevent any delays to the construction process.

With the aim of reducing risks to drivers and components being transported, several mitigative and preventive measures will be put in place. These will include (amongst others):

- Develop a Project specific TTMP to be adhered to in order to reduce risks to drivers, local road users and pedestrians (where applicable).

- EPC contractor will prepare, implement, and regularly update a Construction Environmental Management Plan (CEMP). This will include permitted routes to the site and traffic management requirements and audit plans to all sub-contractors and third-party suppliers to verify their eligibility to meet the E&S obligations prior to contracting as set out in Project CEMP.
- Movement of the Project traffic will be limited to the planned route only with no off-road driving permitted.
- Speed limits for all construction related vehicles shall be always adhered to prevent damage to roads and other infrastructure (estimated travelling speed in rural settlements correspond to 60 km/h for main streets and 30-40 km/h for local streets / roads; 5km/h on the Project site).
- Regular maintenance of vehicles and use of manufacturer approved parts will be adopted to minimize potentially serious accidents caused by equipment malfunction or premature failure.
- Appropriate measures to maintain / make good the access roads will be adopted.
- Temporary site compound will be properly arranged to include parking for involved vehicles, as well as HGVs manoeuvring, holding, and unloading areas.
- Training programs shall be conducted before the activities' commencement for all the drivers for raising awareness about road safety and adopting best transport and traffic safety procedures.
- Procedures for ensuring appropriate licenses / permits for all drivers will be implemented and suitable training to reduce potential accidents on route to, and within, the site will be provided.
- Appropriate measures to control the delivery / departure of all HGVs will be applied to avoid conflict with other road users.
- Potentially affected villagers will be made aware of the schedule prior to the movement of trucks and transportation of power plant equipment in the Project area.
- Collaboration with local communities and responsible authorities to improve signage, visibility, and awareness of traffic and pedestrian safety. This could include advance training and awareness.
- Construction times will be arranged to avoid local peak times and routing arrangements, particularly for HGVs, to minimise potential impacts.
- The traffic movement in the settlement areas will be limited for the daytime only unless under exceptional circumstances.

- All drivers will be made aware of sensitive receptors potentially identified en-route including the location of the ancient cemetery close to the access road and Project site boundary.

11.6 Residual Effects and Conclusions

The transportation of equipment and materials to the Project site will utilise the paved highway and dual carriageway both of which are suitable for and regularly used by HGV vehicles, as well a minor unpaved local road with low traffic flow volumes to be upgraded and paved for the purpose of the Project.

Considering the mitigation measures proposed to alleviate potential impacts, the assessment concludes that there will be no significant residual effects associated with transportation of materials and equipment during the construction and operation phases of the Project.

12 Socio-Economic Impact Assessment

12.1 Introduction

The Social Impact Assessment (SIA) discussed herein identifies both beneficial and adverse impacts potentially arising as a result of the Project in relation to socioeconomics. The development of the SIA comprises several key stages, including:

- Two rounds of stakeholders' engagement and consultations, performed during the Scoping and the ESIA phases respectively.
- Establishment of the baseline conditions, with particular focus on socio-demographic characteristics, presence of potentially vulnerable groups and gender issues, historical background and presence of any conflicts in the area, use of natural resources, livelihoods and land uses, education level, availability of housing, infrastructure and services, major economic activities and employment trends, culture, social-psychological conditions, including attitudes toward the Project.
- Assessment of potential Project-generated impacts on the identified socio-economic receptors.
- Definition of mitigation and monitoring measures aimed at reducing any identified residual impact.

12.2 Information Disclosure, Consultation and Participation

According to the ESIA scope, the public consultation events should be held during the site visit with relevant communities and stakeholders, including observations on settlements within the Project AoI and key characteristics, economic activities, infrastructure and community services, public facilities (schools, markets, religious and community gathering places, etc.), and health facilities (dispensaries, clinics and hospitals). In addition, cultural beliefs and traditions should be investigated during the site visit through visual observations and consultations, especially as regards the intangible cultural heritage sites.

Given the COVID-19 restrictions and quarantine regulations however an adapted approach to respond to these changes was agreed with the Company, restricting the site visit to Project site and its immediate surroundings and performing interviews/consultations through questionnaires and calls with representatives of the Project potentially affected district (Garadagh District) and settlements (Alyat, located 8 km south-east of the Project site, and Gobustan, located 5 km east – north-east of the Project site). The approach has been developed in compliance with IFC Interim Guidance of Stakeholder Engagement in the context of Covid-19 of May 2020.

A Stakeholder Engagement Plan (SEP) has been also developed in parallel with the ESIA, setting out the proposed consultation following initial review of available data, including a community grievance mechanism. Interviews have been carried out with key stakeholders to collect required social baseline data and consultation have been performed through local consultants (Synergetics and Sulaco) in country. The SEP also includes consultation carried out with regards to the development of the OHL (cumulative project within this ESIA) and the Livelihood Restoration Plan (LRP). LRP stakeholder engagement took place in September 2021 and during January 2022 and included:

- A face-to-face meeting with farmers and herders to inform them of the Project, current status of the ESIA and potential impacts and mitigation measures, details of the Project schedule, and to request their permission to conduct a household questionnaire and take photos of their farms that reflect their current standard of living. The household questionnaire aimed to gather information on the socio-economic status of farmers and herders and their preferences for livelihood restoration.
- A detailed discussion with four farmers associated with potential compensation strategies, to act as a 'test' to explore the acceptability of the Company's initial approach. Based upon the feedback obtained from these four farmers, the livelihood restoration measures stated in the LRP document were refined.

During all engagements, details of the Company's grievance mechanism was disclosed so that this could be used to raise any concerns or complaints at an early stage so that they can be recorded, investigated and resolved.

It is acknowledged that representatives of Garadagh District and its Municipalities are usually informed of community needs by conducting online surveys (especially during the COVID-19 pandemic) among the population and by collecting the citizens' applications posted on social networks and on electronic applications. Also, the municipality are able to hold meetings once a month based on the appeals of the community.

According to the responses gathered through Wood/Synergetics questionnaires, the most effective communication methods with local groups/representatives were performing regular group meetings with community members who have similar interests, disclosing newsletters, publishing information on relevant websites, mass-media, and performing personal face-to-face communication. Most appropriate engagement methods to reach vulnerable people were found to be individual meetings with elders and community representatives, which are organized on the basis of the requests/applications received by the citizens and are generally held in dedicated structures or online.

12.3 Impact Assessment Methodology

The following activities were completed during preparation of the ESIA to inform the social impact assessment components:

- A review of publicly available information was competed to gather as much relevant regional and (where this existed) local socio-economic data. This information was used to prepare the regional baseline summary which was then supplemented through the primary social data gathering activities which are described in the bullet below.
- Wood's local consultants, Sulaco and CST Synergetics undertook six site visits on 28 and 29 July 2020, 09 and 10 April, 14, 19 and 23 April 2021; also, questionnaires have been distributed during both the Scoping and the ESIA consultation rounds to interview the competent ministries and local administrations (community leaders and municipalities' representatives).
- A range of stakeholder engagement activities were undertaken during preparation of the Livelihood Restoration Plan (LRP) (September 2021 and during January 2022) which have also informed this assessment.

ADB's 2009 Safeguard Policy Statement Safeguard Requirements 4 requires that for projects involving facilities and/or business activities that already exist, or are under construction, the borrower/client will undertake an environment and/or Social Compliance Audit, including on-site assessment, to identify past or present concerns related to impacts on the environment, involuntary resettlement, and Indigenous Peoples.

The objective of the Social Compliance Audit is to: 1) examine if land acquisition and resettlement is (or will be) compliant with provisions of the relevant Government's laws and regulations on land acquisition, compensation, assistance and resettlement; and 2) determine whether actions were in accordance with ADB's safeguard principles and requirements for borrowers/clients and to identify and plan appropriate measures to address outstanding compliance issues.

This assessment covers any prior land or right of way acquisition, involuntary restriction of access to protected natural parks or forests, land use transfer or any past or ongoing involuntary resettlement impacts or activities that may have been undertaken in the proposed Project Area in anticipation of the Project proposed for ADB financing. The Social Compliance Audit has been prepared as a standalone document.

The Project's positive and negative impacts are assessed with reference to baseline socio-economic conditions and take into consideration the following:

- The type of the impact, including whether the impact is direct or indirect, and/or reversible or irreversible.

- The duration (i.e. temporal dimension) of the impact, including whether the impact is short (up to or less than a year), medium (few years years) or long-term (lifespan of the Project), and/or temporary (few weeks/months) or permanent.
- The extent (i.e. spatial dimension) of the impact to reflect the expected change that may take place at a national (Azerbaijan) level, regional level or local community or individual household level. Local-level impacts are expected to be experienced by residents of the settlements in the vicinity of the Project.
- The magnitude of the impact which reflects the extent of change that is predicted from baseline conditions and the number of communities or households potentially affected.
- The sensitivity of the receptor, taking into consideration stakeholder value that reflects the importance of changing a receptor's current status (this reflects stakeholder outcomes during the various engagements completed).
- Gender and vulnerability considerations that are relevant to the impact being assessed so that these issues are systematically evaluated across the social impact assessment.
- The likelihood or probability of the impact occurring during the Project to the receptor, based upon the Project's aspects and professional experienced from similar Projects in Central Asia.

Impact magnitude is defined as below.

Table 12-1: Definitions for Impact Magnitude

Impact Magnitude	Criteria
High	Very significant, permanent / irreversible change to key characteristics, livelihoods or features of the receptor's character or distinctiveness.
Medium	Significant, potentially permanent change, over the majority of the Project's site and potentially beyond, to key characteristics or features of the receptor's status, character or distinctiveness.
Low	Noticeable, temporary (during the Project duration) change, over a part of the Project's site, to key characteristics or features of the receptor's character or distinctiveness.
Negligible	Noticeable, temporary (for part of the Project duration) change, or barely discernible change for any length of time, over a small part of the Project's site, to key characteristics or features of the receptor's character or distinctiveness.

Receptor sensitivity is defined in Table 12-2.

Table 12-2: Definitions for Receptor Sensitivity and Value

Receptor Sensitivity & Value	Value
High	Sensitivity: Receptor has a very low capacity to accommodate the impact. Value: Receptor has key characteristics which contribute significantly to the distinctiveness, and character of the socio-economic receptor (e.g. community health, physical security, food security, social cohesion, living standards, livelihood condition, mental well-being, etc.).
Medium	Sensitivity: Receptor has a low capacity to accommodate the impact. Value: Receptor has key characteristics which contribute significantly to the distinctiveness and character of the receptor (e.g. very important to some households in an affected village, but not all).
Low	Sensitivity: Receptor has some tolerance to accommodate the impact. Value: Receptor only has characteristics which are important to few people or households.
Negligible	Sensitivity: Receptor is generally tolerant and can accommodate the impact. Value: Receptor characteristics do not make a significant contribution to local socio-economic conditions, living standards or mental well-being.

The impact magnitude and the receptor sensitivity are combined to determine the magnitude of the effect, as illustrated in Table 12-3. Moderate and Major effects are considered significant.

Table 12-3: Significance Matrix

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

12.4 Baseline Conditions

Information concerning the socio-economic context has been gathered from a combination of desk-based sources (i.e., census, statistics, documents and other publicly available secondary sources) and on-site visits as far as possible given current COVID-19 restrictions in place in country, stakeholders' interviews and consultation. Wood's local consultants, Sulaco and CST Synergetics undertook six site visits on 28 and 29 July 2020, 09 and 10 April, 14, 19 and 23 April 2021; also, questionnaires have been distributed during both the Scoping and the ESIA consultation rounds to interview the competent ministries and local administrations (community leaders and municipalities' representatives). Furthermore, site visits were carried out in September 2021 and January 2022 to inform the LRP. The site visits and observations have been focused on the 5km Project AoI as characterized and defined under section 4.1.

12.4.1 Settlements in the AoI and Administrative Structure

Azerbaijan is made up of 11 economic regions, 63 districts / rayon, 78 towns, 261 settlements / small villages, and 4,248 rural settlements[53].

As shown in Figure 12-1 below, the Project site is located in a desert / semi-desert zone 60 km south of Baku, within the coastal zone of the south-eastern part of the Gobustan plain, in the south-west of the Absheron Peninsula, in the Garadagh administrative District of Baku within the Greater Baku Region (Garadagh district). No populated places have been identified within the Project area, while limited number of farmers from 3 or 4 closest livestock farms to the site have been observed to use the Project site for grazing and driving livestock.

The Garadagh District Executive Power is the representative office of the President of Azerbaijan in the district. Within the limits of its authority, the main objectives are coordinating the work of local representatives, adopting acts of regulatory and normative nature, providing social, cultural, and spiritual guides to the population, developing and implement programs for socio-economic development in the territories entrusted.

The Garadagh District comprises 21 settlements, where the local administration is being managed by the Municipalities and Executive Power/Representatives. The main administrative units close to the Project site are the urban areas within Gobustan (located 5 km east – north-east of the Project site) and Alyat (located 8 km south-east of the Project site) settlements.

[53] https://www.stat.gov.az/ - Data by the State Statistical Committee of the Republic of Azerbaijan, last accessed in April 2021.

Municipalities are forms of local self-government and non-state system for organizing the activities of citizens within the territories established by the laws of Azerbaijan. Among their powers, the municipalities design and implement programs for social protection and social development, economic development and local environmental programs.

The smallest local administrations of municipalities (informal administration but still recognized by local communities as traditional authorities) are represented by the community leaders, while community organizations include board of elders, religious communities (Mosques), and special civil servants.

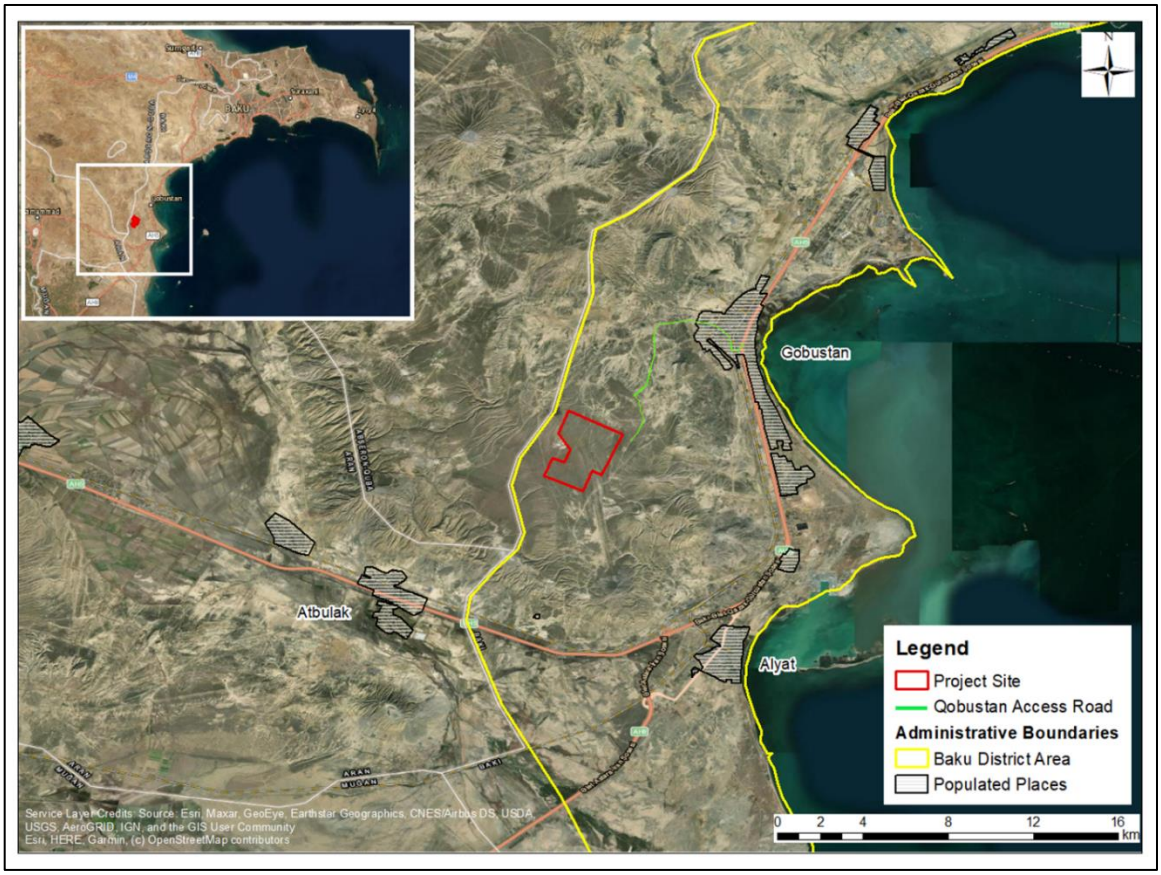


Figure 12-1: Location of Project site, Qobustan access road and surroundings settlements

12.4.2 Land Use and Land Tenure

The land within the Project Area and surrounding region is owned by the government and is classified as industrial, being allocated for use in the oil and gas industry by the Ministry of Energy. The land has been specifically allocated by the Ministry of Energy for the development of the solar PV plant, and a Land Lease Agreement shall be signed in April 2022 between the Company and the Ministry of Energy. The Project Area is currently being used by local farmers and herders for animal grazing activities during the winter months. Figure 12-2 illustrates key features and farms in the Project surrounding area.

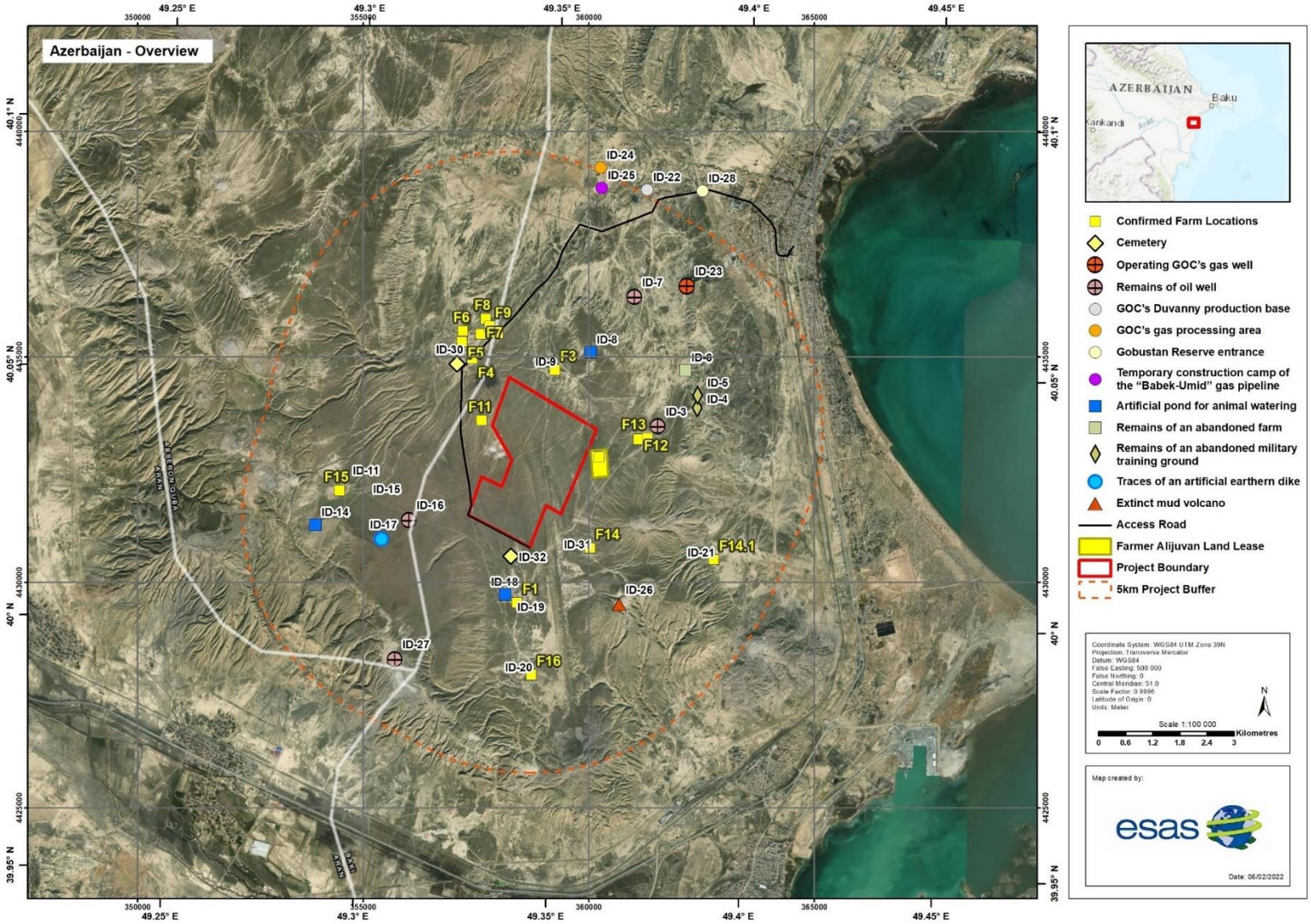


Figure 12-2: Location of Key Features and Farms within Project Area

Within a 5 km distance from the outer boundary of the Project Area, there are 16 farmers using land informally in the regional area. Five of the farmers do not use the Project land and therefore there is a total of 11 farmers who graze their animals in the area (identified through stakeholder engagement with local farmers and government representatives). Out of the 11, four have written agreements, none of which are legally valid. The Ministry of Agriculture does not have the authorization to issue lease agreements to farmers as the land has historically (and still is) classified as being for industrial usage only. The only entity that has decision making power over this land is Ministry of Energy, and all documents given by other entities are invalid.

Land within the Project Area is used as winter pasture from October to April, although sometimes the dates of arrival and departure from individual farmers and herders does vary and this depends upon the prevailing weather conditions.

Of the 11 farmers, 10 use the area to graze their animals between October and April and one farmer grazes his animals throughout the entire year. These farmers also employ 14 herders to look after their livestock. All herders using the area are employees of the farmers and are using the facilities (houses and barns) of the farmers. There are no independent herders. The herders also have animals of their own. If the herders lose their job (or decide to move on), they lose their access to land. All farmers and herders have been living in the area for more than 5 years.

The 11 farmer and 14 herder households, in total 25 project affected households (PAHs) consist of 53 + 55 = 108 family members or Project Affected People (PAPs). As the area has long been established as an industrial zone whose use rights only belonged to the Ministry of Energy, the farmers and herders are considered to be informal users of the land.

Stakeholder engagement activities with farmers and herders have indicated that several farmers have full time jobs not related to agriculture and they are not living in the area, instead hiring herders to keep their livestock.

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Stakeholder engagement activities with farmers and herders have indicated that several farmers have full time jobs not related to agriculture and they are not living in the area, instead hiring herders to keep their livestock. Details of the farmers and written agreements are expanded upon in the LRP. Note that this includes all of the socio-economic baseline information gathered from all farms within a distance of 5 km.

12.4.3 Demographic Characteristics and Ethnic Groups

Azerbaijan is the largest (with a total land surface area of ~86,600 km^2) and the most populous country (with a population over 10 million) in the southern Caucasus. According to the Statistical Yearbook 2020 released by the State Statistical Committee of the Republic of Azerbaijan[53], the total population of Azerbaijan results to have consistently increased over the period 2006 – 2020. Its size at the beginning of 2020 was 10,006,700, out of which, 52.8% of people were shown to be living in urban areas, with the remaining 47.2% inhabiting rural areas. The greatest concentration of the population is found in the coastal areas, with 2,293,000 people located in the capital of Baku. Population density is a current issue in country and allocation of land for the construction of private houses is needed to address the consistent population growth.

Most of the population in Azerbaijan are within the age range of 30-34 (Figure 12-3). When looking at the entire population, the gender ratio of the country is quite even (50.1% females and 49.9% males). However, based on percentages from the population census, there is a larger proportion of males among the younger population (ages 0–25), and a larger proportion of females among the population aged 35 and over. Life expectancy at birth of the Republic of Azerbaijan has consistently increased over the last two decades and, it was equal to 78,8 years for females and to 74,0 years for males in 2019 (Figure 12-4).

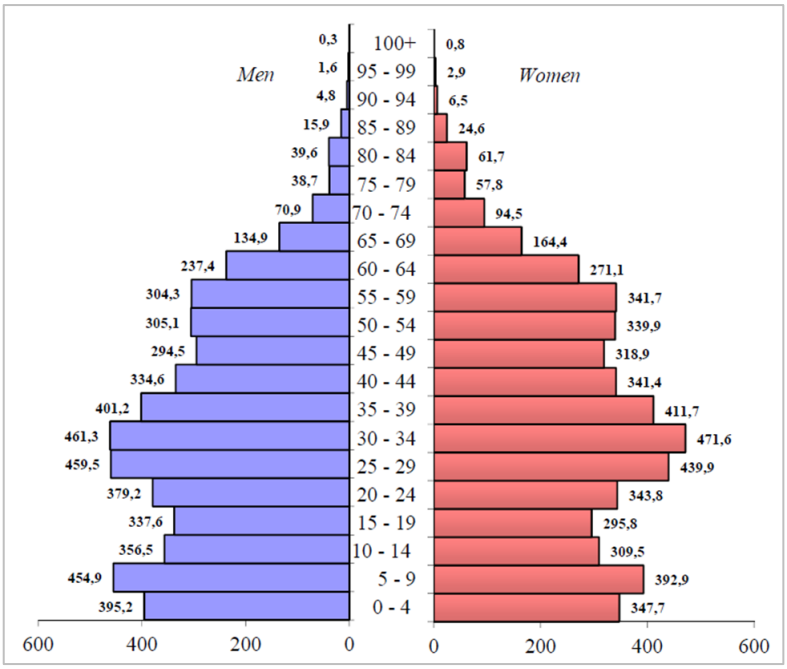

Figure 12-3: Composition of the population of the Republic of Azerbaijan by sex and age groups at the beginning of 2020 (thousands of persons)[53]

From a regional perspective, the population of the Garadagh District increased from 118,500 people in 2014 to 127,900 people in 2020, growing at an average annual rate for 1.28%.[54]

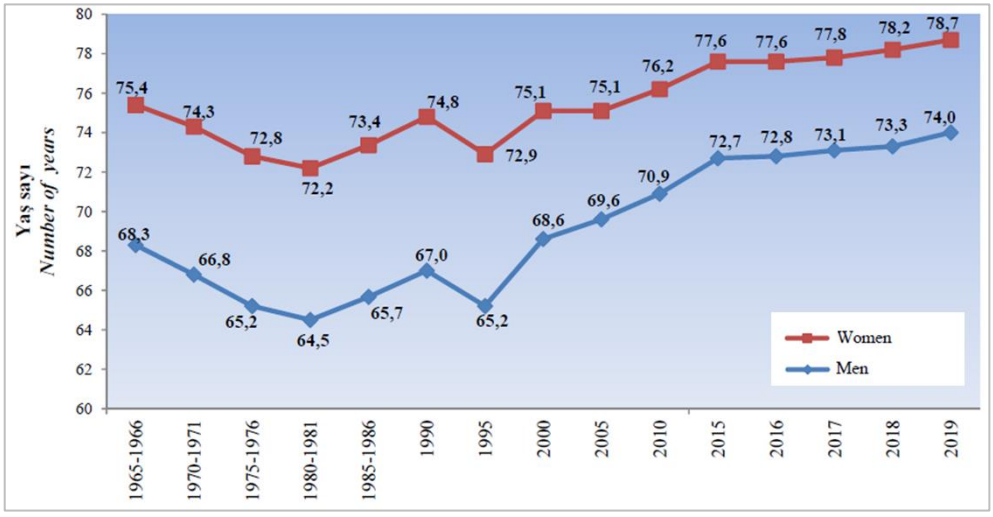

Figure 12-4: Life expectancy at birth per gender, over the period 1965-2019[53]

[54] Health Statistics of Azerbaijan - knoema.com

At the time of the 2009 census, Turkic-speaking Azerbaijanis (Azeris) made up 91.6% of the population. The remaining population comprised a small concentration of minorities, including Lezgians (2%), Armenians (1.3%), Russians (1.3%), and Talysh (1.3%). Lezgins (also known as Lezgi or Kyirin) are the largest ethnic minority in Azerbaijan, accounting for 2% of the population, corresponding to 180,300 people recorded in the 2009 census[53].

As shown in Figure 12-5, of the total arrivals (2,000 persons) to Azerbaijan for permanent residence in 2019, the most were from Georgia (36.6%) and Russian Federation (28%)[53]. The main reason for immigration in Azerbaijan since 2015 is family reunification with a close relative in the country, more than immigration for work[55]. Many Azerbaijanis also go abroad to work (1,600 persons in 2019), with the Russian Federation being the most popular destination (48.1%), followed by Kazakhstan (25.5%)[53].

The official language is Azerbaijani spoken by 98.6% of the population; Russian is spoken by 7.6% of people in Azerbaijan, while only 0.8% speak English[53]. The religious distribution in Azerbaijan is relatively homogenous as the 96% of Azerbaijanis are Muslim, and the majority of the remaining 4% are Christian, Jewish, or Zoroastrian[56].

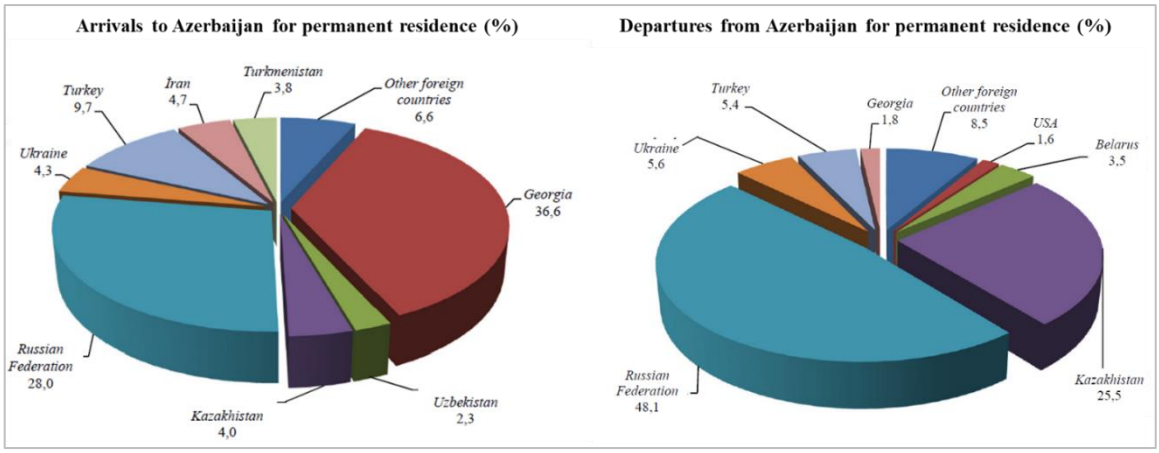

Figure 12-5: Azerbaijan's international migration for permanent residence purposes in 2019[53]

For PAHs, data gathered for the livelihood restoration plan (LRP) studies, indicated that there are no female-headed or internationally displaced people (IDP) households. Further information is provided in the table below.

[55] Azerbaijan: Pre-existing situation and impact of the 2020 Nagorno-Karabakh conflict - Acaps, December 2020.

[56] Azerbaijan: Religious Pluralism and Challenges of Cultivating Identity - Al Jazeera Centre for Studies, October 2015.

Table 12-4: Summary of PAH's Status

Parameter	Farmer Households (11)	Herder Households (14)	Total
Number of female-headed households	No	No	No
Number of IDP households	No	No	No
Number of single parent households	1	1	2
Number of households where an adult cannot read or write	1	1	2
Number of households where Azeri is not their nationality	No	No	No
Number of households which do not speak Azeri at home	No	No	No

12.4.4 Education and Culture

Azerbaijan has free, compulsory primary and secondary education and has achieved almost universal adult literacy (99.8% in early 2020). Over the past 15 years, the country has achieved a high level of primary and secondary education enrolment for both girls and boys[57]. People aged 15 years old and over having higher and secondary education corresponded to 97.3% population in 2020[53], while the enrolment rate in university and college education is around 20.0% for both sexes[57].

Increasing access to preschool education is a challenge that the Azerbaijan government is currently addressing, as only 16.7% (128,826 in total, Table 12-5) of children aged 1–5 was enrolled in preschool education institutions in 2020. Out of these children, 77.3% is in urban localities, while the remaining 22.7% is in rural areas[53].

The number of national educational facilities, both state and non-state owned, are reported in Table 12-5, along with number of students per each institution[53].

[57] Azerbaijan Country Gender Assessment - Asian Development Bank, December 2019.

Table 12-5: Azerbaijan's educational facilities in 2019[53]

National Education Facilities	Number of Facilities	Number of Students
Preschools	1,840	128,826 children
Day education facilities	4,433	1,616,105 pupils
General educational institutions	7	1,033 pupils
Vocational education schools	110	23,193 students
Specialized secondary institutions	59	56,000 students
Higher education institutions	52	187,654 students
Institutions carrying out PhD programs	119	2,239 persons
Institutions carrying out DSc programs	90	611 persons

As shown on the left in Figure 12-6, women comprise 77% of higher education students compared to 23% of men; by contrast, women comprise only 26% in technical and technological fields compared to 73% of men. Women comprise the majority of teachers in most levels of general education and at secondary vocational education level, while men are teachers mostly in higher education levels (Figure 12-6, on the right) [57].

The funds allocated from the State budget of Azerbaijan for social-cultural measures represented 7% of the GDP in 2019 (corresponding to 5,686.1 million AZN in total), including expenses for education (2.7%), social protection (2.7%), health care (1.1%), culture, art, information and physical training (0.4%), social security (0.1%), and science (0.1%)[53].

Based on the information gathered via interviews held with local administrations (community leaders and municipalities' representatives), the percentage of the population within the local area with high school education is very low in pasture areas, while around 30-40% within main settlements and people with middle school or less education represent approx. 50% of the population in Garadagh District and in Alyat and Gobustan settlements. Almost 100% of the population can read and write, and there are no challenges for the educational system and school access, apart from rare cases of education avoidance due to religious beliefs or to the fact that girls might be forced to marry at early ages. There is a need of opening vocational institutes to provide the local population with training and specialties courses. Three newly repaired schools are reported by local farmers to serve people using land within the Project AoI, plus a Vocational school No. 330.

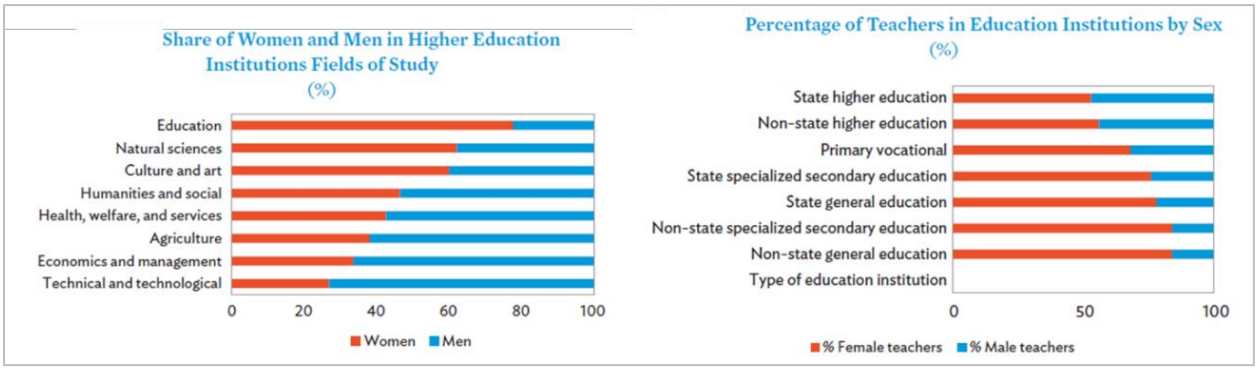

Figure 12-6: Share of women and men in higher education institutions fields of study (on the left) and percentage of teachers in education institutions by sex (on the right) [57]

Data collected for the purposes of the LRP illustrate that, within the PAHs, there are two households where an adult is unable to read or write.

12.4.5 Economy, Income and Employment

Azerbaijan's total GDP was just over USD 48 billion in 2019. The GDP annual growth rate was 2.2% for 2019, and -5% for 2020, but the forecasts for 2021 and 2022 are 1.9% and 4.5% respectively[58]. GDP comprises industry (41.4%), agriculture and fishing (5.7%), construction (7.3%), transportation and communication (7.8%), net taxes (8.7%), and other sectors (29.1%)[53].

Azerbaijan is a fast-developing economy, mostly driven by developments in the oil and natural gas sectors and export. Considering the volatility of oil prices and the drop of crude oil prices due to the COVID-19 pandemic in early 2020, there is a pressing need to further diversify the economy of Azerbaijan towards non-oil sectors such as agriculture, fishing and livestock production and move towards a modernised energy system.

Other important economic sectors include manufacturing and services such as tourism, finance and telecommunications. The overall contribution of fisheries to national food security and poverty reduction is generally low, but there are areas where fisheries are important for the rural economy and the livelihoods of coastal communities. Agriculture also plays an important role in providing employment and livelihood for a large portion of the population in Azerbaijan.

According to data provided by the State Statistical Committee of the Republic of Azerbaijan, 4.9 million people were employed in 2019, corresponding to 49.5% of the total national population and to 95.2% of the economically active population (96% of men and 94.3% of women). The unemployment rate, calculated by considering persons receiving unemployment status, was equal to 4.8% in Azerbaijan in 2019. Distribution of employed population by economic activities

[58] https://data.worldbank.org/country/AZ - Last accessed 13/4/2020.

was as follows: 36.0% in agriculture, forestry and fishing; 14.4% in trade and repair of transport means; 7.8% in education; 7.4% in construction; 5.7% in public administration, defense and social security; 5.3% in manufacturing; 4.2% in transportation and storage; 3.9% in human health and social work activities. Average monthly nominal wages and salaries were equal to 635.1 AZN in Azerbaijan in 2019, corresponding to approx. 375.5 USD[53].

Economy within the Garadagh District is dominated by the industrial sector, primarily including oil and gas (State Oil Company of Azerbaijan Republic "SOCAR" facilities), cement production factories, and stone quarries, followed by services (i.e., school, kindergarten, shops), agriculture, and tourism (related to the presence of Gobustan Reserve, mud volcanoes and new geopark to be established – refer to Chapters 5, 6 and 9) sectors. Based on the information gathered via interviews held with local administrations (community leaders and municipalities' representatives) and operating companies, main local businesses in Qobustan and Alyat municipalities' area include trading, small farming, animal husbandry (i.e., sheep-breeding), and heavy vehicle transportation of gravel and sand.

Most of employees are locals or Azerbaijanis from other regions of the country, while foreign specialists are generally less involved. However, within local communities in Garadagh, there is the feeling that more labour force is attracted from other regions of Azerbaijan and the local residents are thus left without work. The average daily income ranges approx. between 10 and 30 AZN in the investigated area, corresponding to approx. 6-18 USD (considerably lower if speaking about herders especially during drought), and labour conditions are considered generally good by stakeholders engaged No inequalities for gender in terms of income / employment are perceived.

Job opportunities in Gobustan and Alyat municipalities slightly increased over the last five years, with reference to positions like electrician, foreign language teacher, crane operator, welder, computer science specialist, and metal worker. However, unemployment remains a main issue in the area, along with the inability of Municipalities to collect property taxes and the financial challenges that local business and economic growth should face, and the rest of the world, job opportunities have decreased due to the pandemic.

Unemployment and financial problems affecting the local economy are mainly due to the lack of expertise and vocational training courses, the inability in using modern professional technologies, and the expensive tariffs for making energy careers. The Education, Training and Certification Department of SOCAR has been thus carrying out training for new workman personnel at vocational training institutions on individual professions, providing instruction to those admitted to enterprises and organizations of the company on labor protection and safety rules, attestation of welders working at enterprises and organizations and certification thereof to international standards. Recruitment for new firms is generally managed by the relevant departments of the executive power in Garadagh District, as well as by Employment Department/Agency, and it is currently performed online and electronically due to the COVID-19 pandemic.

In the last few years, the Azerbaijani Government has undertaken different activities aimed at counteracting problems associated with the unemployment situation in country. The Alat Free Economic Zone (AFEZ) is being established next to Alat Port to intensify local and foreign investment in the country's non-oil sector. AFEZ will use its strategic geographic location to provide a regional investment hub and boost competitiveness in the Europe-Caucasus-Asia and North-South transport corridors. Moreover, the Agency for Sustainable and Operative Social Provision (DOST Agency) was established under the Ministry of Labor and Social Protection of Population of the Republic of Azerbaijan (Presidential Decree No. 229, dated August 9th, 2018) to solve inequalities and financial problems associated to unemployment issues. Locally, in accordance with the spatial possibilities, families are provided with cattle free of charge.

A further socio-economic study conducted for the LRP in 2021 found that the average income of the farmers is generally higher compared to the herders. There are some farmers that have formal employment and other sources of income, including within the oil and gas industry and are therefore more resilient to external sources of change to their livelihood, compared to herders. A few of the herders engaged with are paid in livestock rather than just cash, whilst others are just paid in cash. The herders rely on farmers providing them with access to land and in this sense, they are 'tenants', whereby if they lose their job or decide to move on to another location, they lose access to this land. Herders typically move in and out of the region frequently, some decide to move on seeking improved economic opportunities elsewhere, whilst others may stay for long periods of time. Herders typically have their own livestock as well and it is estimated from the socio-economic surveys that around 20% of a herd can belong to the herder and 80% may be owned by the farmer.

Table 12-6: Household Income and Expenditure

Parameter	Farmer households	Herder households
Household monthly income (AZN)	0 = 0 – 250 3 = 251 – 500 4 = 501 – 1,000 0 = 1,001 – 1,500 1 = 1,501 – 2,000 1 = 2,001 – 2,500 0 = 3,001 – 3,500 0 = 3,501 – 4,000 0 = 4,001 – 4,500 0 = Above 5,000 2 Don't know / refused to answer	2 = 0 – 250 3 = 251 – 500 5 = 501 – 1,000 1 = 1,001 – 1,500 0 = 1,501 – 2,000 1 = 2,001 – 2,500 0 = 3,001 – 3,500 0 = 3,501 – 4,000 0 = 4,001 – 4,500 0 = Above 5,000 2 Don't know / refused to answer
Primary source of household income	0 (Profits from self-employment) 3 (Government salary) 3 (Private company salary) 2 (Selling livestock or livestock products) 0 (Selling crops at a market) 0 (Selling wild plants) 0 (Catching wild animals) 3 (Other - pension)	1 (Profits from self-employment) 1 (Government salary) 0 (Private company salary) 12 (Selling livestock or livestock products) 0 (Selling crops at a market) 0 (Selling wild plants) 0 (Catching wild animals) 0 (Other)
Primary category of household expenditure	3 (first highest expense is food) 8 (second highest expense is animal feed/water) (Third highest expense is other expenses)	8 (first highest expense is food) 6 (second highest expense is animal feed/water) (Third highest expense is other expenses)
Number of households in substantial debt	2	2
Reason for the loan	0 (To pay for health costs) 0 (To repay an earlier loan due to debt) 2 (To buy food for livestock) 0 (To cover education costs)	0 (To pay for health costs) 0 (To repay an earlier loan due to debt) 2 (To buy food for livestock) 0 (To cover education costs)

Parameter	Farmer households	Herder households
	0 (To construct or repair a house) 0 (Other - specify)	0 (To construct or repair a house) 0 (Other - specify)

It is clear from the data collected during the 2021 socio-economic survey that herder households are more vulnerable to external sources of change (such as land access restrictions, drought, increases in animal feed costs, etc.) compared to farmer households, although both types of household experience very similar challenges to their livelihoods. What is also clear is both types of household's reliability on single areas of land for their livelihood, very few have an alternative land area available. Farmers have a much wider source of income compared to herders.

Farmers recruit herders to look after their livestock using verbal (not written) contracts. If a written contract is agreed between a farmer and a herder then they would need to pay tax and potentially provide other benefits, so farmers just provide verbal contracts only. Many of the farmers live on the outskirts of Baku City or Gobustan settlement, leaving the herders to live at the farm in shelters and basic accommodation. These structures are provided and maintenance by the farmer and access is granted whilst the herder is employed. The herder typically stays with his family and provide bedding and basic provisions, with all livestock equipment (fences, enclosures, etc.) being provided and owned by the herder.

Sometimes the herders can comprise part of the extended family of the farmer. The herders move with the entire livestock herd (their own and the farmer's animals as well) using large trucks and vehicles, to the summer pasture which varies considerably. The family moves with the herder so that they do not become separated. During the summer, farmers typically stay at their same location as they have other sources of income (see below) and visit the summer pasture area on an occasional basis. When the livestock herd is moved, this typically takes 2-3 weeks to move all of the animals. The women and children of the herder typically move in advance to establish the next place of living and wait for the male of the household (the herder) to arrive when all of the animals are transported.

A review of stakeholder engagement records has identified the following consistent challenges to land-based livelihoods in the Project Area and surrounding region:

- A lack of water. Households are typically forced to purchase drinking water, and also water used for livestock. Farmers are familiar with groundwater conditions in the Project Area and have indicated that the water is acidic, and it is possible for oil and gas to be abstracted from the ground compared with water suitable for humans or livestock.

- Poor quality pastureland. There are no dense areas of vegetation within the Project Area or wider region and in general, the land provides relatively low productivity. The Ministry of Agriculture have indicated to the SPV that based upon the land's productivity in kg per hectare then the annual price of replacement feed is USD 15,000/year. Both farmers and herders reported that drought conditions mean result in a very low level of grassland being available for the animals.
- No access to electricity. It is typically the herders who live in the farm buildings during the winter months and lighting the home is a challenge, with the majority of households relying on kerosene oil lamps.
- The purchase of animal feed. The cost of providing 'top-up' animal feed during the winter months was mentioned frequently during the stakeholder engagements, reflecting the high cost of purchasing this material for livestock.
- Poor access roads. During winter months, heavy rain result in access roads becoming muddy which prevents access by cars. This is particularly difficult for small vehicles.
- The mobile phone coverage in the region is very poor and this prohibits herders and farmers communicating with their broader family, each other, and others in general.
- Firewood is used for cooking and warmth inside the home. Due to the lack of trees in the local area, this source of fuel is increasingly hard to obtain.

State Program of socio-economic development of the regions of the Republic of Azerbaijan in 2019-2023

The "State Program for Socio-Economic Development of the Regions for 2019-2023" [59]was developed by the Ministry of Energy as a means of further enhancing achievements in the field of social and economic development of the country, particularly in regional and rural areas. In particular, the following has been planned or partially implemented till end of 2020:

1. *Increase electricity production in the country, including the construction of small hydropower plants - Partially implemented*

   On June 17, 2020, SNC-Lavalin's Atkins submitted a final report to the Ministry of Energy on the results of research on improving the operation of small hydropower plants in Azerbaijan and the efficient use of hydropower potential of rivers.

   Based on this report, a development strategy for small hydropower plants will be developed, taking into account the needs of electricity generation, water potential and water scarcity in our country.

[59]https://minenergy.gov.az/en/dovlet-proqramlari/azerbaycan-respublikasi-regionlarinin-2019-2023-cu-illerde-sosial-iqtisadi-inkisafi-dovlet-proqrami

The construction of Astara-1 small hydropower plant with a total capacity of 0.26 MW, located in the southern region, has been completed. The construction of Oguz-1, Oguz-2 and Oguz-3 small hydropower plants with a total capacity of 3.6 MW in Gabala region is being completed.

2. *Construction of power plants on renewable energy sources - Partially implemented*
   During 2020 with the support of the Asian Development Bank, the work on the pilot project "Knowledge exchange and technical support for the development of floating solar panels" continued, and discussions on identifying and evaluating local potential contractors, as well as capacity building events, conducted.
   The project envisages the installation of a 100kW solar panel system on Boyukshor Lake, as well as the formation of business models to promote the participation of the private sector in the use of solar energy, strengthening national capacity through training. Although the project was expected to be completed by March 2021, the Asian Development Bank has extended this period until March 2023. Considering that the introduction of floating solar photovoltaic energy systems in Azerbaijan will form an overview of the use of unused lakes, reservoirs and reservoirs for new business opportunities.
   In addition, a number of important steps have been taken to attract foreign investment in the construction of renewable energy power plants, memorandums of understanding and frameworks outlining common areas of future cooperation with many international companies to strengthen cooperation in the use of renewable energy sources and encourage future investment.
3. *Assessment of biomass energy potential in rural areas, production of biofuels and bioenergy from agricultural waste, implementation of pilot projects to meet the energy needs of agro-industrial enterprises through alternative and renewable energy sources - Partially implemented.*
4. *Development and implementation of pilot projects related to the use of renewable energy sources in irrigation- Partially implemented.*
5. *Supporting the use of biofuels and solar collectors in the heating of greenhouses - Partially implemented.*
6. *Application of alternative and renewable energy sources in the energy supply of agro-complexes and promotion of bioenergy production using waste generated there- Partially implemented.*

12.4.6 Agriculture and Animal Husbandry

Agriculture is one of the most important sectors in Azerbaijan. As of 2019, approximately 4.7 million (47.2%) of the total population live in rural areas, and 36.0% make their livings by agriculture, forestry, or fishing activities. Of the 86,600 km^2 of the country's territory, 55.2% (47,797 km^2) corresponded to utilised agricultural areas in 2019, of which 50.7% are used for pastures and haymaking, 43% are arable lands, 5.5% are permanent crops and 0.5% are fallow lands. Azerbaijan's used agricultural area per capita has decreased over the last 15 years, from 0.57 ha in 2003 to 0.47 ha in 2019[53].

Of the land sown, 90% can be irrigated, and soil for further development remains available. However, 40% of Azerbaijan is affected by land erosion and 40% of irrigable land is affected by salinisation. These issues, along with water resource shortages, have restricted agricultural potential in a country with a large agriculture workforce. The 90% of farms are small holdings occupying 85% of the national land. These farmers face difficulties accessing markets, and their small size and lack of connection has resulted in challenges managing national value chains, restricting food exports[60].

As shown in Figure 12-7, gross agricultural products from private owners, family peasants, and households are calculated as 7,123.5 million AZN, and gross agricultural products from agricultural enterprises are calculated as 713.2 million AZN, yielding 7,836.7 million AZN in total in 2019. The gross agricultural output in million AZN shows that the shares of plant and animal products were almost equal in 2019, corresponding to 47,9% and 52.1% respectively. The gross output deriving from plant-growing products is mainly represented by vegetables, cereals and leguminous, and fruits and berries, while the gross output deriving from livestock products is mostly to be associated to cattle and poultry, followed by milk production[53].

[60] Organic Agriculture in Azerbaijan: Current Status and Potentials for Future Development – FAO, 2018.

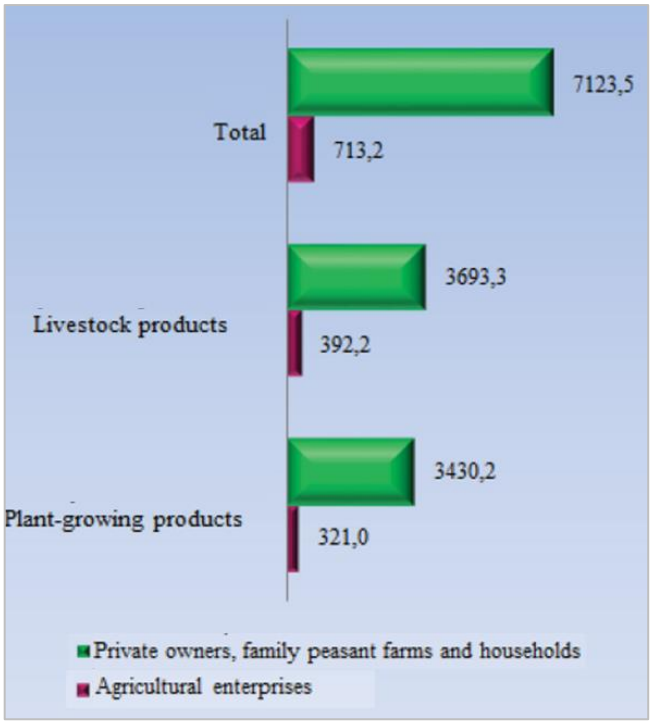

Figure 12-7: Gross agricultural products by category of farms, by actually prices (expressed in million AZN), 2019[53]

The farms within 5 km of the Project boundary primarily focus on the raising of small cattle, lambs and goats, and from cattle, cows, bulls, calves, as well as horses. The quantity of small cattle or cattle in different farms is different. The number of heads in a flock of sheep on average ranges from 100 to 300, and in herds from 50 to 150 and more heads. In addition, most farms keep small number of poultry (chickens, geese, ducks). On farms, the animals are looked after and taken care of by shepherds or hired farmers from nearby villages, and guard dogs are used to guard the animals at night.

Farm buildings consist of one or more one-story basic dwellings, buildings for storing tools and hay, summer pens and winter cattle barns, built in rows from local building material (brick) or other materials at hand. There are small backyards fenced with metal mesh near the dwellings in some farms, where fruit trees are planted. The power supply is provided by diesel generators.

All farms have metal or concrete reservoirs of water for animal watering, and ponds near the farm are made from earthen dike, where rainwater is collected, and in the absence of rain, the ponds are filled with imported water. Depending on the location of the farm, drinking water and water for animals are brought either from the Gobustan settlement or from neighboring villages in the Hajigabul region.

All farms have one or more vehicles that are used to bring in and out animals, food, fodder and transport to the city and neighboring areas. Several vehicles have been seen transporting animals and delivering food and hay through several dirt roads crossing the site in all directions.

The average daily income in the area is based on seasonal variation and reportedly by farmers in the area very limited anyway. It is generally spent on the animal's grass and feed and hardly meet people needs. Farmers highlighted the need for assistance from Government agencies in allocating summer pastures for residents' use. Also, improving good water and electricity access in the area could help foster the cattle-breeding activities. Generally, there are no adequate services reported for pastures areas, especially water shortage. It is reported that herders / farmers need to buy water with 20–30-ton water trucks when not available on natural ponds. Poor waste management practices also could affect animal health.

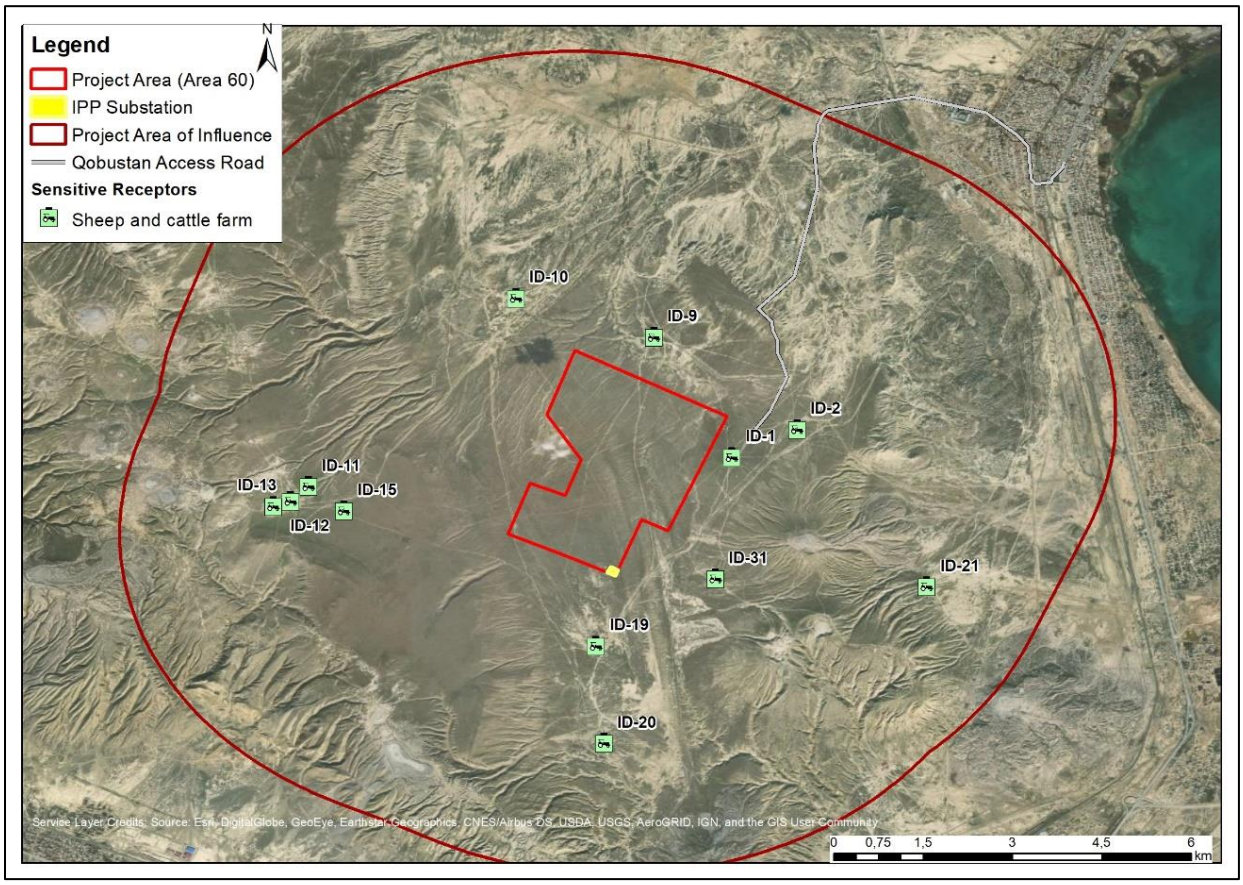

Figure 12-8: Location of farms within 5km from the Project site (Project AoI)


Artificial earthen ponds for animals' watering


ID-1


ID-2


ID-9


ID-10 and 11


ID – 12 (An olive grove is planted near the farm on a 1 ha plot)


ID- 13


ID- 19 and 20

Figure 12-9: Farms located in the vicinity of the Project Area

12.4.7 Infrastructure and Community Services

Azerbaijan has achieved 100% electricity access, but power generation, transmission, and distribution networks are aging, resulting in some service disruptions, with distribution losses between 15-20% in some places [57]. It is estimated that only 70% of households have access to electricity for the entire day, even though the power network is widespread. The systems are particularly degraded in suburban areas, where available facilities cannot provide a reliable source of energy to customers. While about 91% of urban residents have access to gas supply, the figure is only 42% in rural areas. According to the WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (2015), Azerbaijan had 91% of the population using an improved water source, with 98% of urban residents having an improved water source compared to 83% of rural residents. Only approximately 40% of rural households have access to sanitation compared with close to 90% of urban households. With regards to piped water, the figures are around 47% for rural households and 96% for urban households[55].

Considering the above, the Government has been investing in a Strategic Roadmap for the Development of Utilities Services (i.e., electric energy, heating, water, and gas), with the aim of improving services to better meet consumer demand and installing an efficient and responsive service[57].

Azerbaijan has moderate mobile, mobile-broadband, and fixed broadband penetration compared to closer Asian countries despite old Soviet-era infrastructure. Based on the official national statistics, 81% of the population used the internet in 2019[55].

Based on the information gathered via interviews held with the competent ministries and local administrations (community leaders and municipalities' representatives), problems associated with infrastructures and community services in Garadagh District and in Alyat and Gobustan settlements mainly relate to the deterioration of roads and of public transport service, poor development of waste management facilities, lack of an efficient sewerage system, and lack of telecommunication system (especially in new urban areas and winter pastures where also internet access is limited or not existing). Lack of drinking water of good quality has been also reported, especially in Gobustan. The availability and quality of educational and health facilities was highlighted to be good. The lack of road infrastructures serving the new housing units are necessary to provide a link between the new urban areas and the settlement center. However, increasing of green area, parks, roadside trees are reported within Gobustan.

The sewerage system in the settlements of the Garadagh district is old and poorly functioning, sometimes completely absent. This usually causes the direct discharge of wastewater into the sea and into the lakes, thus polluting the environmental matrices and wasting natural resources that could be treated, recycled, and reused. Moreover, the lack of landfills for household waste collection and disposal, as well as the lack of waste management systems, contributes to creating environmental and health issues in the area of interest. In this context, the municipality of Alyat is taking action to develop specific programs aimed at renovating the sewerage network in the AFEZ and at realizing dedicated waste treatment facilities. Also, more than 7 km of water drainage canals have been constructed to prevent floods.

12.4.8 Housing Condition

A large proportion of the existing housing stock in Greater Baku Region was built before the 1990s; according to a UNECE housing study, more than 80% of residential buildings were built 40-50 years ago, 30% of which require urgent repairs or reconstruction due to lack of maintenance over the past decades. Around 77% of the existing housing stock constitutes Multi-Family Buildings (MFBs), which have suffered from lack of maintenance due, in part, to unclear property rights over common areas and inefficient housing management systems. Typical problems in these MFBs include crumbling facades, broken windows, visible cracks in walls and floors, non-functional elevators, dilapidated common areas, and poorly maintained facades. A lack of public housing support and high private rental prices often push lower-income households to live in informal housing, risking exposure to dangerous or unhealthy conditions[61,62].

Based on the information gathered via interviews held with local administrations (community leaders and municipalities' representatives), housing is generally provided by private houses and apartments in good conditions in Garadagh district, but also by reed houses built in the 1950s which are planned to be demolished in the next few years due to their poor conditions and replaced by new houses.

[61] ECA Housing: on shaky ground? – World Bank Group, Understanding Risk Conference of Belgrade, September 2018.

[62] Greater Baku: Housing Sector Diagnostic – World Bank Group, 2015.

Considering the population growing phenomenon that Azerbaijan is currently facing, the need of building new housing opportunities is of relevant importance in country. In response to the apartments' overcrowding, municipalities have given available lands to the population for the construction of private houses, as there are currently no land funds allocated to the municipalities. As a consequence, Garadagh District is currently facing the issue of illegal registration of private houses.

Housing conditions in both Alyat and Gobustan settlements are generally good with reference to gas and electricity services, access to good water supply is reportedly an issue for Gobustan. Sewage system is described as in bad condition generally in the region, and telecommunications and heating systems are usually not provided.

Locally, within the pasture areas, farmers in general reported poor water availability and quality, poor sewage system and mostly use of generators but some of them have grid connection. The socio-economic survey carried out to inform the LRP in September 2021 found that the majority of households within 5 km of the Project boundary are forced to purchase water and have a lack of sanitation devices.

Table 12-7: Household Access to Water and Sanitation

Parameter	Farmer households	Herder households	Total
Number of households that are forced to purchase water due to no other supply being available	11	14	25
Number of households that do not have a sanitation device in the home area (open defecation)	9	14	23

The 2021 survey also found that household's main source of lighting is from oil/kerosene lamps, batteries and generators/animal fat/dung. A greater proportion of farmer households use batteries/torches and solar compared to herder households. In relation to the main source of cooking energy, the main type used is oil/kerosene, firewood and dried animal dung in both farmer and herder households. Details are illustrated within Table 12-8 below. There are no significant differences between the two types of households.

Table 12-8: Household Sources of Energy

Parameter	Farmer households	Herder households
Household main source of lighting	7 (Oil/kerosene) 0 (Gas) 2 (Candle) 5 (Battery/torch) 1 (Solar) 0 (Electricity) 0 (Paraffin 0 (Firewood) 4 (Other - generator, animal fat, lamp, dung)	11 (Oil/kerosene) 0 (Gas) 1 (Candle) 0 (Battery/torch) 0 (Solar) 0 (Electricity) 0 (Paraffin 0 (Firewood) 10 (Other – lamp, generator, flashlight, animal fat)
Household main source of cooking energy	4 (Oil/kerosene) 0 (Gas) 0 (Electricity) 0 (Paraffin) 5 (Firewood) 0 (Charcoal) 8 (Animal residue / dried cattle dung) 0 (Crop husks/remains) 2 (Other -bringing food from home, gas cylinder)	4 (Oil/kerosene) 1 (Gas cylinder) 0 (Electricity) 0 (Paraffin) 5 (Firewood) 0 (Charcoal) 5 (Animal residue / dried cattle dung) 0 (Crop husks/remains) 9 (Other – gas cylinder, gas bottle, generator)

12.4.9 Public Health

As shown in Figure 12-10, Greater Baku Region, where the Project site is located, is one of the areas hosting the highest number of healthcare facilities and medical staff in Azerbaijan.

At the beginning of 2020, there were 12 hospitals (2% of national hospitals) and 11 ambulance polyclinic service organizations (0.6% of national ambulance polyclinic service organizations) in Garadagh district. The number of hospital beds per 10,000 inhabitants was equal to 53.6 in the district, which is higher than the national average of 44.5, and the numbers of physicians and paramedical staff per 10,000 people were equal to 29.6 and 60.8, respectively[53].

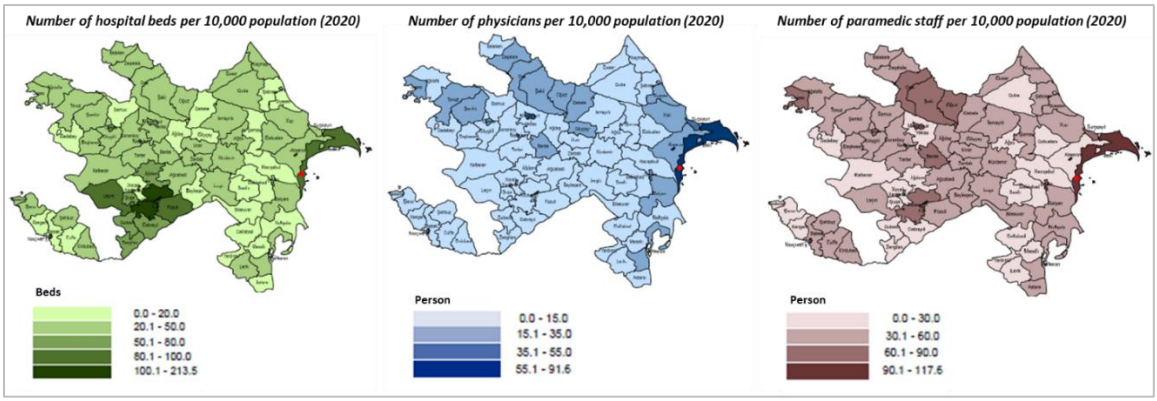

Figure 12-10: Healthcare and medical staff distribution level in Azerbaijan in 2020 (Project site location is shown in red)[53]

Azerbaijan's average life expectancy is 76.4 years (74 for men and 78.7 for women). According to official government data, the under-one infant mortality rate in 2019 was 11 per 1,000 live births, a reduction from 12.7 per 1,000 in 2005. Maternal mortality reduced from 28.9 (per 100,000 population) in 2005 to 14.9 in 2019[53]. The cause of most deaths in country in 2019 was related to diseases of the circulatory system (327,8 cases for 10,000 population), followed by neoplasms (89 cases for 10,000 population) [53].

Communicable diseases are an issue in Azerbaijan, particularly tuberculosis (TB), as a high rate of circulation of drug resistant strains of TB is present in the country (Figure 12-11). Based on a survey conducted by WHO, Azerbaijan is one of 18 high-priority countries to combat tuberculosis. According to official statistics, new cases of HIV are slightly declining with 495 cases detected in 2011 compared to 477 in 2017 among the population aged 15–49 years old. Generally, men are likely to get communicable diseases more than women in Azerbaijan[57].

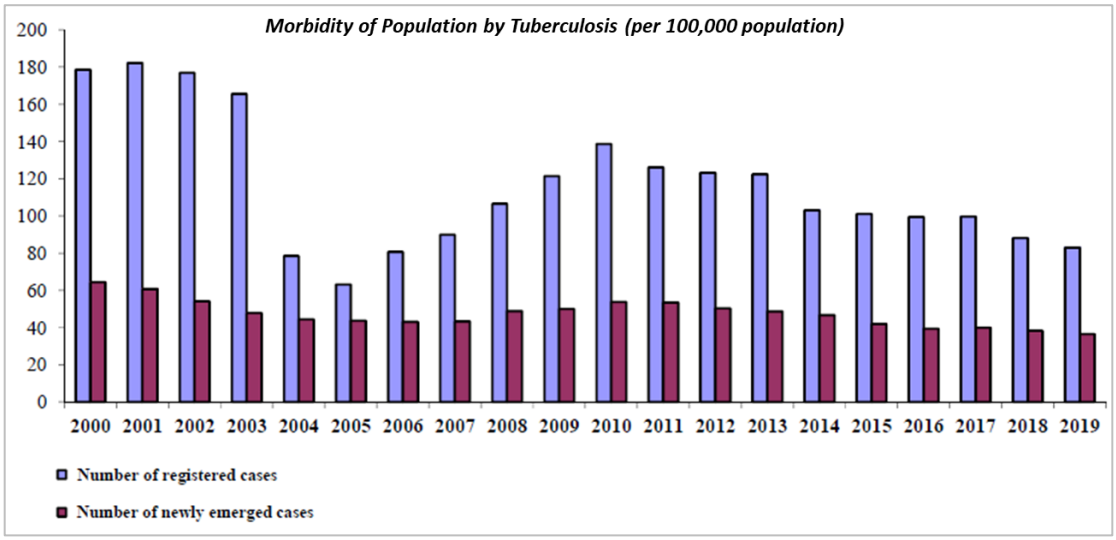

Figure 12-11: Morbidity of population by tuberculosis (per 100,000 population)[53]

Based on the information gathered via interviews held with local administrations (community leaders and municipalities' representatives), health facilities in Alyat and Gobustan lack qualified doctors and medical equipment, including ambulances for first aid purposes and emergencies. The municipalities' citizens were generally forced to move at least 40-50 km to reach the main health facilities which are located in Baku or Shivran, but it has been acknowledged that the recent commissioning of United City Hospital No. 17 in Gobustan will ensure the availability of all types of medical services (still the lack of doctors is reported).

The main health problems in Alyat and Gobustan settlements are chronic respiratory diseases, iodine deficiency (Endemic UR), rheumatism, pressure, diabetes, liver and lungs diseases; drugs and alcohol abuse are also to be considered a current issue in the area. During the last six years from February 01 to May 31, a full medical examination campaign is conducted according to the President's instructions for early examination of the disease.

United city hospital No. 17 and Children's polyclinic No. 9 in Gobustan are reported as the main health facilities nearby in the Project area, serving Alyat and Gobustan area settlements. United city hospital No. 17 is located in close proximity to the start of the access road up to the Project site.

12.4.10 Community Security

In 2019, a total of 26,672 crimes were reported in Azerbaijan, which is equivalent to 26.6 crimes per 10,000 people[53]. The majority of reported crimes are non-violent, with murder, violence, and rape comprising 2.8% of total crimes. Organised crime is present in Azerbaijan, active primarily in drug, people, and counterfeit trafficking[63].

According to the information obtained in the interviews/questionnaires, drugs or alcohol abuse and family breakdowns have increased, while domestic abuse/violence have generally decreased. Homelessness is not a spreading phenomenon in this area and, generally, no cultural/ethnic issues and disparities, as well as social tensions, result to affect the area of interest.

12.4.11 Vulnerable People

The Project has the potential to impact vulnerable people. Vulnerable people may require special resettlement assistance measures because they are less able to cope with economic displacement compared with others.

[63] https://www.interpol.int/ - INTERPOL Website, last accessed 14/4/2021.

A list of vulnerable people that could, potentially, be directly affected by the Project through land access restrictions and land use change, has been compiled and is listed below:

- Persons who are elderly.
- Families who have lost both parents (they are orphans).
- Families where a disabled child is present, or a disabled parent is present.
- A family who is on a low income and lives below the national poverty line. This is classified by the State Statistical Committee for 2020 (the most recent published data available) to comprise a monthly household income of 195 AZN (USD 115) or less, or a household in substantial debt.
- A widower raising two or more children under the age of 14, living separately from other relatives.
- Mothers or fathers who are bringing up the children in a single-parent family.
- Families in which both parents are unemployed.
- Single retired persons living on their own.
- Internally Displaced Persons (IDP) household.
- People with poor health status, or illiteracy in a farmer or herder household; and
- People who are discriminated against in society due to their ethnicity, belief system, health status (including HIV/COVID-19), sexual or gender orientation/self-identity.

According to the information gathered via interviews held with local administrations (community leaders and municipalities' representatives), vulnerable people are considered as the elderly people, single headed households, vulnerable women, families of martyrs, people with disabilities and people receiving social allowances from public institutions in Alyat and Gobustan, which are the closest settlements to the Project site. Women in Azerbaijan considered as vulnerable due to their disadvantaged position in economy, access to justice and other services.

Due to unemployment and/or low income, vulnerable people generally face financial difficulties which may cause homelessness problems and make them unable to access the rehabilitation centres.

During the stakeholder consultations held for the ESIA, due to current conditions and limitation due to the pandemic, it was only possible to interview a martyr's father and Community leaders / elderly committees of the main Alyat and Gobustan settlements which could be considered as representatives of vulnerable people in the area. Leaflets in the local language were also distributed to reach everyone within the communities. A further socio-economic baseline study was however conducted in mid-2021 for the Livelihood Restoration Plan (LRP) studies with the findings detailed further below.

Garadagh rayon/district Executive Power reported Gazi as among vulnerable groups. Gazi are person who took part in the war or other word Veteran. After 44 days of Second Karabakh war number of Gazis and shehids (martyrs) have increased in the country including Qaradagh rayon.

The Ministry of Social Protection of Population and Garadagh District Executive Power put in place some development programs for vulnerable groups in Garadagh District. These programs included the establishment of the Paralympic Committee Idea Center aimed at allowing people with disabilities to practice sport and to compete internationally in the Paralympic Games, the provision of refresher courses for people with different levels of disabilities by YARAT Center based in Baku, the provision of accommodation by order of the President of Azerbaijan, and the referring of 2nd and 3rd groups of disabled people to the Housing Maintenance Area (HMA) to provide a job.

A detailed vulnerability analysis is provided in Table 12-9 that reflects the range of groups listed above that could, potentially be impacted. The results of the LRP socio-economic survey were subsequently used to determine if any vulnerable people are present in the households of affected farmers and herders. A range of special assistance measures to vulnerable people is provided within the LRP.

Table 12-9: Vulnerability Analysis

Group	Sources of Vulnerability
People who are elderly (aged 65 and above).	Older people may not be as economically active compared to younger people and may be more vulnerable to any change in their livelihood or living conditions. Older people may also experience greater mental stress when dealing with significant change.
Families where a disabled child is present, or a disabled parent is present.	Families with a disabled adult or child are likely to be particularly susceptible to any changes in their socio-economic status, due to the need to provide care for the affected person.
A widower raising two or more children under the age of 14, living separately from other relatives.	A widower is likely to be particularly susceptible to any changes in their socio-economic status, due to the need to provide care for children without a partner who is economically active.
Mothers or fathers who are bringing up the children in a single-parent family.	Single parent families are likely to be particularly susceptible to any changes in their socio-economic status, due to the need to provide care for children without a partner who is economically active.
Families in which one or both parents are unemployed and are registered at centres to promote employment and social protection of the population as jobseekers.	Parents without work are likely to be particularly susceptible to any changes in their socio-economic status due to limited sources of household income.
Single retired persons living on their own.	Retired people are likely to be particularly susceptible to any changes in their socio-economic status due to limited sources of household income
Internally Displaced Person household.	IDPs may have less access to land and other types of resources compared to the rest of the population, as they have historically been internally displaced by conflict.
A household living below the national poverty line, or is in substantial debt.	Households in substantial debt may use any cash provided to clear (some or all) of their debts instead of using the money to restore their livelihood and standard of living. Additional support may be needed to these households. Households who have a very low-income are also considered to be vulnerable as any minor change in their livelihood could have significant effects.

Group	Sources of Vulnerability
People with poor health status, or illiteracy in a farmer, herder or farm worker household.	People living with physical and/or mental disabilities, or poor health status, may be vulnerable as they may experience difficulties in accessing Project-related (and non-Project-related) employment opportunities and/or undertaking livelihood activities, thereby constraining their ability to provide for themselves, leading to a reliance on relatives, community members, NGOs, and the government for support. People living with physical and/or mental disabilities, or poor health status, may be subject to discrimination and marginalisation in the workplace and/or the local community. Differential treatment and/or exclusion in these settings may lead to social isolation and reinforce the vulnerability of this group. People living with physical and/or mental disabilities, or poor health status, may need specific types of assistance to be keep adequately informed about the Project, resettlement choices, and may not understand written documents used during a resettlement implementation process. They also be discriminated against which could lead to reduced access to health care, thereby exacerbating the health problems experienced by this category of vulnerable group.
People who are discriminated against in society due to their ethnicity, belief system, health status (including HIV/COVID-19), sexual or gender orientation/self-identity.	People who experience discrimination are typically unable to be influential within the community, assist in decision making processes, and 'be heard'. People who experience discrimination can find it difficult to access employment opportunities which reduces their potential to generate income.

A summary of the number of people in each PAH is provided in Table 12-10. The references to the farmer and herder households are the same as those used in Figure 12-2. The location reference is used more than once in some cases to reflect the presence of both a farmer household and a herder household at the same location. The final column in the table reflects the presence of vulnerable people along with details as to why the person is classified as vulnerable. Based upon the information in Table 12-10, a total of 8 farmer and 7 herder PAHs are considered to be vulnerable.

Table 12-10: Summary of PAHs and their Vulnerability Status

Location Reference	Household Reference	Total No. of People	No. of Females	No. of Children (under 18 years)	Number of Vulnerable People (reason in brackets, total in BOLD)
Farmer Project Affected Households (11 PAHs in total)					
PAH-1-0	Mehdiyev Hesenkhan farmer	7	3	0	2 (people 65 and over) **= 2**
PAH-2-0	Ibrahimov Alijuvan farmer	6	3	3	1 (people 65 and over); low-income family based on indicated monthly income and number of people in it **= 6**
PAH-3-0	Manafov Bahish farmer	4	1	0	n/a
PAH-4-0	Huseynov Hemze farmer	5	1	0	n/a
PAH-5-0	Ali Suleymanov farmer	7	2	0	1 (person with 1 disability), 7 (Household in substantial debt due to the need to buy food for livestock); low-income family based on indicated monthly income and number of people in it **= 7**
PAH-6-0	Murad Abdulayev farmer	4	2	2	Low-income family based on indicated monthly income and number of people in it **= 4**
PAH-7-0	Arif Azimov farmer	1	0	0	1 (disability due to back problem) **= 1**
PAH-8-0	Mushfig Mirzali farmer	3	1	0	n/a

Location Reference	Household Reference	Total No. of People	No. of Females	No. of Children (under 18 years)	Number of Vulnerable People (reason in brackets, total in BOLD)
PAH-9-0	Anar Naghiyev farmer	5	2	3	Low-income family based on indicated monthly income and number of people in it =5
PAH-10-0	Karamat Ullayev farmer	4	2	2	4 (Household in substantial debt due to the need to buy food for livestock) **= 4**
PAH-11-0	Elshan Rahimov farmer	7	4	5	low-income family based on indicated monthly income and number of people in it **= 7**
	TOTALS	**53**	**21**	**15**	**8 households (36 people in total)**
Herder Project Affected Households (14 PAHs in total)					
PAH 1-1	Gedirov Heqani herder (Hesenkhan farmer)	4	2	2	n/a
PAH 1-2	Gedirov Ahmedhan herder- (Hesenkhan farmer)	3	1	0	Low-income family based on indicated monthly income and number of people in it = **3**
PAH 1-3	Gedirov Fariz herder (Hesenkhan farmer)	3	1	1	n/a
PAH-2-1	Ibrahimov Mahir herder (Alijuvan farmer)	5	3	3	n/a

Location Reference	Household Reference	Total No. of People	No. of Females	No. of Children (under 18 years)	Number of Vulnerable People (reason in brackets, total in BOLD)
PAH-2-2	Khankishiyev Elvin herder (Alijuvan farmer)	3	2	1	
PAH-3-1	Omerov Hajiaga herder (Bahish farmer)	4	1	0	
PAH-3-2	Manafov Babek herder (Bahish farmer)	4	1	0	1 (Household in substantial debt due to the need to buy food for livestock) **= 1**
PAH-5-1	Vahidov Hoshbext herder (Ali farmer)	3	3	1	
PAH-5-2	Azizov Akif herder (Ali farmer)	4	2	1	1 (people 65 and over) 4 (Household in substantial debt due to the need to buy food for livestock) **= 4**
PAH-5-3	Miri Hajiyev herder (Ali farmer)	5	2	2	Low-income family based on indicated monthly income and number of people in it **= 5**
PAH-6-1	Zaur Abdulyaev herder (Murad farmer)	8	4	6	Low-income family based on indicated monthly income and number of people in it **= 8**
PAH-7-1	Nahid Azimov herder (Arif farmer)	4	1	2	Low-income family based on indicated monthly income and number of people in it **= 4**

Location Reference	Household Reference	Total No. of People	No. of Females	No. of Children (under 18 years)	Number of Vulnerable People (reason in brackets, total in BOLD)
PAH-8-1	Hilal Shahmammadov herder (Mushfig farmer)	4	2	2	Low-income family based on indicated monthly income and number of people in it **= 4**
PAH-10-1	Subhan Babayev herder (Karamat farmer)	1	0	0	
	TOTALS	**55**	**25**	**21**	**7 households (29 people)**

Internally Displaced Persons (IDPs)

Azerbaijan has a relatively high number of internally displaced persons (IDPs), mostly from Lachin, Aghdam. According to UNHCR there were 652,300 IDPs in Azerbaijan at the end of 2019[64], while the government-reported numbers are slightly lower, at 620,000 IDPs. IDPs are settled in scattered communities throughout Azerbaijan, the majority in peri-urban settings around major cities such as Baku and Sumgayit (located approx. 55 km North to the Project site).

Support has been provided, notably by the World Bank, the United Nations Development Programme (UNDP), the United Nations High Commissioner for Refugees (UNHCR), and the European Union (EU), as well as an active international non-governmental organization (NGO) sector.

Azerbaijani Government reinforced its investment in providing IDPs with housing, employment opportunities, and ensuring rights over the last years. However, many IDPs continue to live in dire conditions in collective public buildings in urban areas as well as in rural settlements badly in need of repair. According to the State Committee of Affairs of Refugees and Internally Displaced Persons of the Republic of Azerbaijan, IDPs are: entitled to free medical examination treatment and medication; priority for job retention in cases of redundancies; free of citizenship charges; free of court charges; free of paying certain taxes; and are free of notary charges when purchasing residential houses or flats[65].

The number of IDPs in Garadagh District has increased over the last five years, currently accounting for about 25,000 people. However, the relocation of IDPs from tented camps to new settlements, such as Umid settlement, has provided housing solutions to some IDPs families, thus reducing the number of IDPs in both Alyat and Gobustan settlements, which currently account for 56 (191 people) and 84 (270 people) IDPs families respectively. No IDPs have been identified in the Project area or surrounds.

[64] 2019 End-Year Report – Subregion: Eastern Europe; UNHCR, The UN Refugee Agency; July 2020.

[65] State Committee of Affairs of Refugees and Internally Displaced Persons of the Republic of Azerbaijan: http://idp.gov.az/en/

12.4.12 Gender Assessment

Azerbaijan's 1995 constitution, and the legislation passed since then, detail that men and women have equal rights by legally reinforcing gender equality across a number of areas (i.e. property rights, education, state services, labour market, prosecution of domestic violence, etc.). A national body for gender equality (State Committee for Family, Women and Children Affairs) is also active in mainstreaming gender into state policies, programs, and laws and in developing information systems for gender-related monitoring[57].

However, gender inequality is apparent in employment rates and wages, as women are less active in the formal economy than men because of a gendered division of formal labour. As shown in Figure 12-12, fields dominated by women are human health and social work (77%), education (73%), and arts, entertainment, and recreation (63%). Education, health, and social services employ 55% of all women participating in the labour force, while less than 20% of women work in higher-paid sectors (i.e. mining, construction, electricity and gas production). Women are thus mostly concentrated in the low-paid sectors[57].

On average, women in Azerbaijan spend three times the amount of time as men doing unpaid domestic work. Women in rural areas are faced with a triple workload as they have greater responsibility in domestic tasks, contribute labour to the farm, and also must earn off-farm income. Domestic labour and care for family members might be considered as the main barriers for engaging in income-generating work and for economic empowerment[57].

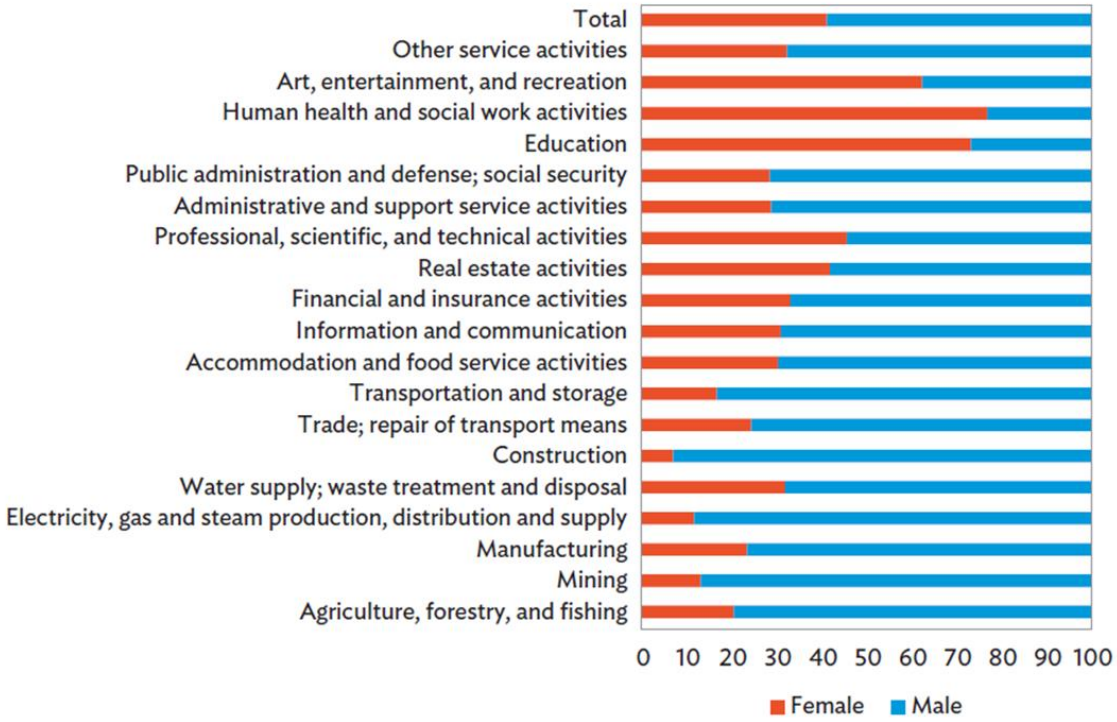

Figure 12-12: Percentage of female and male employees by economic activity in Azerbaijan in 2017[57]

Gender inequality is not strongly perceived by local communities living in Alyat and Gobustan settlements, where women generally have greater responsibility for child-raising and domestic tasks. However, the need to increase employment opportunities (i.e., opening of weaving shops), let women acquire knowledge and skills through attendance at free courses, or develop recreational centres for both children and adults has been raised at same time by both Alyat and Gobustan settlements stakeholders interviewed.

Women are also in a more disadvantaged position with low wages in various sectors of economy, being often hired as cheap labour without proper contracts, thus not being protected and eligible for social benefits. Women are more actively involved in these kinds of activities, namely health and social work activities, education, and art, entertainment and recreational industries with numbers higher than those of men. In the majority of economic activities average monthly wages of men are higher compared to average monthly wages of women by 50- 60%. In 2019 the average monthly wage for women was AZN 443.4, or 58 % of the men's average monthly wage AZN 764.8. Women are also heavily concentrated in lower-paid, public-sector activities such as education (74% female), health, and social services (78%).

Table 12-11: Average Monthly Nominal Wages by Types of Economic Activity (2020)[66]

Economic Activities	Average Monthly Nominal Wages (AZN)		
	Total	State	Non-State
Agriculture, forestry and fishing	379.8	389.9	376.8
Mining	2081.3	939.2	2841.4
Manufacturing	452.8	564.1	427.1
Electricity, gas and steam production, distribution and supply	584.6	583.9	609.6
Water supply, waste treatment and disposal	439.9	424.1	619.7
Construction	666.8	491.6	748.1
Trade; repair of transport means	458.5	415.9	458.6
Transportation and storage	616.5	536.9	825.7
Accommodation and food service activities	489.1	1,024.6	468.6
Information and communication	877.2	708.6	1,089.5
Financial and insurance activities	1,196.9	1,397.1	1,147.4
Real estate activities	458.2	420.5	504.8
Professional, scientific and technical activities	736.3	558.6	1201.4
Administrative and support service activities	325.7	298.2	463.0
Public administration and defence; social security	822.1	848.9	281.5
Education	483.4	477.7	697.4
Human health and social work activities	480.0	486.3	431.8
Art, entertainment and recreation	454.9	440.8	909.7
Other service activities	552.1	707.6	536.1

[66] AZSTAT, 2020 https://www.stat.gov.az/source/gender/?lang=en

Economic Activities	Average Monthly Nominal Wages (AZN)		
	Total	State	Non-State
Total	525.6	502.6	587.6

A socio-economic survey was conducted for the purposes of the LRP development. This included women-only engagements with restoration options discussed. There were mixed views on employment for women with some households stating that all people in the household including women would be willing to apply for a temporary job during Project construction however others stated women would not apply. Livelihood restoration measures for women were discussed and could include assistance setting up a small market stall / shop, support to increase household crops and livestock and training and materials for activities such as basket weaving, sewing and similar activities.

12.4.13 Active NGOs and youth organizations

The following organizations have been reported to be active in the AoI, carrying on development programs targeting youths and vulnerable.

- **"Azerbaijan Enlightener" Youth Organization (NGO)** was registered as a public association by the Ministry of Justice of the Republic of Azerbaijan on April 11, 1997. The main purpose of the organization is to help educate young people in the field of education, to implement various projects to improve their educational conditions.
- **"Dirchalish" Economic Research Society (NGO)** was established on 12 February 2000 and officially registered on 18 March 2000 by a decision made by the Board of the Ministry of Justice. The main mission of the "Dirchalish" Economic Research Society is to conduct economic research, promote economic development in communities particularly in family farms which are core components of rural communities, establish contacts between communities, educate them economically and legally, and carry out other activities aimed at the ensuring of their sustainable social and economic development. One of the organization's projects was creation of small business incubators for youth development and youth entrepreneurship skills in Sahil settlement of Qaradagh district.

- **"Assistance to Disabled Children" Public union named after Mushvig**. The main purpose of its activity is to provide social support to people with disabilities and their integration into society. The program of social integration of children with special needs was implemented in Sahil settlement of Garadagh district. The purpose of this program was to create opportunities for children to freely manage themselves in the future, revealing their abilities. Along with socio-psychological and health services for psychological and physical rehabilitation and integration into society, the center also implements an inclusive education system.
- **YAP organization (Yeni Azerbaijan Partiyasi), New Azerbaijan Party.** The party's goal is to strengthen Azerbaijan's state independence and take a place in the modern system of international relations, build a democratic, legal, secular state, create a stable and socially oriented economy, ethnicity, religion, language, property, position, beliefs; ensuring comprehensive and reliable protection of the rights and freedoms of citizens, the formation of a civil society based on the rule of law, social solidarity and a prosperous life, uniting people around the idea of independent statehood and the Azerbaijani ideology. The Qaradagh branch of YAP organization was established on 06 March 1993. The number of members is 12,328 persons.
- **Garadagh District Youth and Sports Department.** The Ministry of Youth and Sports of the Republic of Azerbaijan was established by the Decree of the President of the Republic of Azerbaijan No. 179 of July 26, 1994 and the Resolution of the Milli Majlis of the Republic of Azerbaijan No. 861 of July 26, 1994. In addition to the regions of the republic, it consists of 11 departments and one head office in Baku. Garadagh District Youth and Sports Department has been operating since 30 November 1994. The main working principle of the department is to implement state policy in the field of youth and sports, to create appropriate conditions, equal rights and opportunities for physical, mental and spiritual development of youth, to involve the masses in sports and physical education, to organize their physical education, to train highly qualified athletes. It is the responsibility of the Department of Youth and Sports to prepare informative and analytical materials on the organization and implementation of state policy in the field of youth and sports, to analyze various aspects of the situation of youth in the economic, political and cultural life of the region.

The NGOs listed are not greatly involved in the area local to the Project however they do conduct some activities in the Garadagh region in general.

KOBIA (The Small and Medium Business (SMB) Development Agency) was also consulted during the LRP stakeholder engagement exercises. Amongst the current activities associated with rural agricultural development Projects, the Agency has been implementing a feed processing plant in Zagatala, an incubator plant in Balakan, and the technical assistance project "Support to the development of entrepreneurship in rural areas" funded by the European Union. Amongst the current activities associated with women's economic empowerment and development, a forum on the topic 'Women Entrepreneurship: Current Situation and Prospects' that was held on 23 July 2021. This included discussions on the growing role of women entrepreneurs in business and employment, the sale-exhibition of women entrepreneurs' craftworks that was held on 01 June 2021, the business trainings for women entrepreneurs on April-May 2021 conducted by Sumgayit SME Development Centre, support measures provided by the Agency for Women entrepreneurs, and a special section that has been created on the Agency's website for the purpose of researching women entrepreneurs and disclosing information related to innovations in this field to the public.

12.4.14 Human Rights Context

Civil and Political Rights

Azerbaijan is committed to the principles of the universality, interdependence and indivisibility of all human rights and fundamental freedoms and the national legislation is constantly being improved and brought into line with international standards. The National Plan of Action for More Effective Protection of Human Rights and Freedoms in the Republic of Azerbaijan, which was adopted in December 2011 and whose implementation is coordinated by the Commissioner for Human Rights and its specialized advisers, is an integral part of the continued activities related to protecting human rights and freedoms in the country and includes improvements to the legislative and regulatory framework.

Following a referendum held in September 2016, the Constitution was amended to provide more robust protection for human rights and fundamental freedoms, to establish effective and flexible governance mechanisms, and to ensure the effectiveness of the economic reforms implemented[67].

The Ministry of Internal Affairs, overseeing local police forces and maintaining internal civil defense troops, and the State Security Service are responsible for security within the country and report directly to the president. The State Security Service is responsible for domestic matters, and the Foreign Intelligence Service focuses on foreign intelligence and counterintelligence matters. The State Migration Service and the State Border Service are responsible for migration and border enforcement[68].

The promotion of freedom of thought and expression and the freedom of information are key in building a State based on the rule of law and civil society in Azerbaijan. Government information policy is directed at ensuring consistent and comprehensive guarantees of the constitutionally recognized freedom of thought and expression and the right of citizens to receive information. Freedom of assembly is guaranteed by the Constitution and international agreements to which Azerbaijan is a party and is regulated by the Freedom of Assembly Act[67]. Under article 58 of the Constitution, everyone has the right to create any association, including a political party, trade union or any other voluntary association, or to join an existing association. Political parties representing different political interests, coalitions of political parties and referendum advocacy groups are guaranteed free and voluntary participation in elections and referendums in the country, which are regulated by the Electoral Code[67].

[67] National report submitted in accordance with paragraph 5 of the annex to Human Rights Council resolution 16/21: Azerbaijan - Human Rights Council of UN General Assembly, May 2018.

[68] Country Reports on Human Rights Practices for 2020 - United States Department of State, Bureau of Democracy, Human Rights and Labor (https://az.usembassy.gov/hrr_2020/)

In February 2017, the President signed a decree on improving the prison sector, humanizing penal policy and expanding the use of alternative forms of punishment and non-custodial measures. The National Action Plan for Open Government, 2016–2018, was approved by a presidential decree of 27 April 2016; it includes improvements to anti-corruption legislation, the development of proposals for corruption-related offences, mitigation of liability for economic crimes and their decriminalization, awareness-raising in the fight against corruption, measures to improve electronic services and greater participation of civil society and the public[67].

The Azerbaijani law requires advance notification of peaceful assembly, but in practice a system of authorisation is applied and there have been cases of public assemblies being banned or dispersed and participants being subject to administrative and excessive criminal penalties[55]. Azerbaijan's authorities continued to some kind of control on freedoms of association, expression, and assembly[69].

A human rights scan has been conducted and is included within Appendix G of this ESIA.

Economic, Social, and Cultural Rights

Priorities at the current stage in the country's socioeconomic development include ensuring its sustainable and balanced economic development and accelerated development in the regions. Much has been done to strengthen the financial and technical base of health care, with the building, renovation and reconstruction of new health facilities fitted with modern equipment, including in remote areas. Improved educational facilities in the country and the reforms to the education system are helping to bring positive change. In general, the amount of the State budget allocated to health care and education increases each year.

A number of projects introduced at the beginning of 2017 are aimed at preventing sex-selective abortion and educating young people in country. The projects are being supported by the office of the United Nations Population Fund and the representation of the European Union in Azerbaijan, with the participation of the Ministry of Labour and Social Welfare, the Ministry of Youth and Sport and the State Committee on the Family, Women and Children[67].

[69] https://www.hrw.org/world-report/2020/country-chapters/azerbaijan - Azerbaijan Events 2019, Human Rights Watch

In accordance with article 25 of the Constitution, the State guarantees equality of rights and freedoms, irrespective of race, ethnicity, religion, language, sex, origin, property or official status, beliefs or membership of political parties, trade unions or other voluntary associations. There is a high level of religious tolerance in Azerbaijan, international conferences and meetings are held on religious topics, and discrimination between citizens on the basis of their religious beliefs is prohibited[67].

The Government is continuing to take systematic and coherent measures to raise awareness of and combat discrimination against women. Since 2016, the State Committee on the Family, Women and Children and the Azerbaijan Micro-finance Association have held special training courses for women on financial literacy and starting your own business. In 2015, the same Committee set up a special database with information from various government agencies and rehabilitation centres for victims of domestic violence, and measures concerning rehabilitation, integration and the provision of legal assistance, as well as on the perpetrators of violence[67].

Legislation continues to be improved and practical measures taken to protect the rights of children in the country. Pursuant to the 2012 State procedure for monitoring the implementation of children's rights, the State protects children, by social, legal, economic, medical and educational means, from all forms of exploitation and heavy, harmful or dangerous work and dangerous impacts and takes measures to eliminate or prevent the circumstances that lead to violations of their rights[67].

On 31 May 2018, a new Law of the Republic of Azerbaijan "On the Rights of Persons with Disabilities" was adopted. In accordance with paragraph 1 of part I of Article 94 of the Constitution of the Republic of Azerbaijan, this Law defines the bases of state policy on persons with disabilities and the state's responsibilities in the field of protection of their rights, elimination of risks, all forms of discrimination on the basis of disability; rehabilitation of persons with disabilities, full participation in society and creation of conditions for social integration, active involvement in the decision-making process on strategies and programs related to them, full and equal exercise of the rights and freedoms of persons with disabilities.

The Azerbaijani government investments has been reinforced to provide IDPs with housing, and employment opportunities, and to ensure their rights over the last years[67].

12.4.15 Attitudes Towards the Project

Renewable energy plays an important role in supporting the Azerbaijan's drive for economic diversification. With a view to unlocking country vast potential for renewable energy development, a number of important steps have been taken by GoA to attract foreign investment in the construction of renewable energy power plants, memorandums of understanding and frameworks outlining common areas of future cooperation with many international companies to strengthen cooperation in the use of renewable energy sources and encourage future investment. A number of companies have signed a memorandum of understanding: Turkey's Tekfen Insaat, Russia's Avelar Solar, the United Arab Emirates' Masdar, Norway's Equinor AS, France's Total Eren, Great Britain's BP, Saudi Arabia's Akwa Power, etc.

On 09 January 2020, with the participation of the Prime Minister of the Republic of Azerbaijan Mr. Ali Asadov, the Cabinet of Ministers signed Executive Agreements between the Ministry of Energy and ACWA Power of the Kingdom of Saudi Arabia and Masdar of the United Arab Emirates. Tasks were set before the Commission established by the Order of the President of the Republic of Azerbaijan dated 05 December 2019 No. 1673 to coordinate the implementation of pilot projects related to the construction of power plants on renewable energy sources (wind and solar) in the Republic of Azerbaijan. Allocation of land plots for the implementation of projects was completed during the year, determination of state guarantees to be provided to investors, connection of the power plant to the power grid on the projects, integration of renewable energy sources into the electricity network. The State Oil Company of the Republic of Azerbaijan (SOCAR) addressed a relevant appeal to the Gobustan Operating Company regarding the "Area 60", where the Project will be developed, and the area was alienated by making changes in the relevant agreements through the State Oil Company.

In addition, the Ministry of Energy has launched a new project with the support of the European Bank for Reconstruction and Development (EBRD) to draft legislation defining the mechanism for conducting auctions for projects on the use of renewable energy sources.

Local Consultation

The generation of renewable energy sources in the regions will contribute to strengthening the local economy by reducing the Region's power supply dependence on a single source. The interviewed stakeholders generally have positive attitudes towards the proposed Project as it is expected to create new job opportunities, improve the quality of local communities' services, and contribute to increase the level of environmental protection by reducing greenhouse gas emissions and preventing long-term environmental impacts. Renewable energy is seen as the most modern, environmentally friendly, and cost-effective area for investment in country.

The attitude of local communities to the large companies operating in the area are seen to be very good based on past experiences. The GOC successfully implemented the tasks set in the state programs such as the Regional Development Program of the Republic of Azerbaijan for 2019-23, Strategic Road Map, and Vision for the Future, etc. and submits quarterly reports to SOCAR and other relevant state bodies on the work done. Considering that the industrial enterprises in the area of interest have strong relations with the host communities, it is expected that the Project development will be generally well regarded by most people in the district.

Concerns raised during consultation included:

- The health and safety risks during construction including spreading of COVID-19.
- Potential acquisition of land plots currently used for pasture by local herders.
- The need for preservation of cultural / historical / archaeological / heritage / recreation sites within the AoI.
- Safety measures in connection with earthquakes and volcanoes to be accounted for in the emergency response planning.

Stakeholders Expectations

During the site visit and based on the questionnaires, the interviewees' expectations regarding the Project were noted as follows:

- Construction of a new road for accessing purposes to the Project site.
- Expected employment during the project construction and operation phases. Procurement of goods from local stores.

- Allocation of alternative pasture lands for animal grazing. It should be noted however that the written agreements held by farmers are not legally valid and have no meaning under the Law on Land Lease (1998). There is therefore no legal obligation to provide farmers with alternative land leases. The land within the Project Area and surrounding region is classified as industrial and allocated for use in the oil and gas industry (only) by the Ministry of Energy. It is not legally possible to provide farmers with valid Land Lease Agreements in this area, as the land is not classified as agricultural, and the Ministry of Energy will not permit land to be leased to farmers.
- Potential establishment of entertainment and recreational centres/cultural clubs for women and the elderly, playgrounds and education centres for children. Construction of recreation parks, sport complex and new kindergartens. There are difficulties in establishing leisure time for young people.
- Provide shepherd/ herder houses in the pasture with electricity and good water supply to support their activities. Asphalting of gravel roads. The fee for the electricity may be decreased. the wool shearing process will be easier. Improved access to electricity in the area can enhance heating of greenhouses, the processing of agricultural products. It is important to provide water and bathrooms for women and children living in the winter pastures.
- Support in access to finance. Loans on favourable terms to increase the cattle-breeding.
- Ensure the gender equality.
- Carry out landscaping works. Improve road lighting.
- Establishment of an information center in the field of environmental protection.
- Preserve the natural condition of winter pastures, ensuring that the construction and infrastructure works to be carried out without causing soil erosion and other degradation.
- Avoid dissatisfaction between the hired people who lives in close and far area from the site. Avoid difference between the employee who lives in close area and the employee living far.
- It is important to provide a mobile medical centre nearby the site for the provision of first aid. The medical centre will be provided with serums against snake, scorpion stings. Exposure to wild animals, sunstroke in the summer months, dust storms, provision with drinking water.
- Provision of safety measures, construction of crossings, pedestrian lanes. Strengthening precautionary measures on the roads.

12.4.16 OHL social baseline

There are several infrastructure facilities which are crossed by the OHL route. These include roads, high pressure gas pipes, plastic water pipe, ditches, oil pipeline, canal and railway. A number of farms are also present outside of the OHL route. The location of these are illustrated within Appendix B of this ESIA.

12.5 Socio-Economic Impacts

The Project activities have the potential to directly interact with the social receptors described in Section 12.4.2 and also indirectly influence economic conditions at district and regional level. Social impacts can include changes to people's way of life, employment opportunities, community services and facilities, the community environment, health and well-being and / or community or personal property rights. The assessment has considered the existing social conditions at and surrounding the Project site within the Study Area, and assessed the impact on these baseline conditions, both positive and negative, as a result of the implementation of the Project.

Social impacts may occur at all stages of the Project from construction through operation. Decommissioning impacts are assumed to have similar impacts as construction phase. Following decommissioning land will be returned to the land users for animal husbandry, and the environment will return to their baseline conditions.

The following sections will describe main interactions identified and significance of any impact arising on receptors. The assessment has utilised the assessment methodology as outlined in Chapter 4 (Assessment Methodology). To address EP4 requirements regarding human rights, additional assessment has been incorporated in each of the impact component as applicable.

The following potential aspects were assessed as the most relevant for the social receptors.

1. Reduced access to grazing and pastoral land.
2. Increased local employment and supply demand.
3. Increased pressure on local public services and facilities.
4. Increased presence of workers and interaction with local communities and related Community H&S issues.

It should be considered that the Qobustan access road crosses a very sparsely populated area, and no sensitive receptors are present close to the Qobustan road works. This includes a buffer area of 100 m either side of the road (area of influence defined within Section 4.1 of the ESIA).

12.5.1 Land Acquisition and Economic Displacement

The land within the Project Area and surrounding region is owned by the government and is classified as industrial, being allocated for use in the oil and gas industry by the Ministry of Energy. The land has been specifically allocated by the Ministry of Energy for the development of the solar PV plant, and a Land Lease Agreement shall be signed in April 2022 between SPV and the Ministry of Energy.

The Project has been located away from individual houses and local settlements and therefore there will be no requirement for a physical resettlement and a Resettlement Action Plan (RAP) for the Project is therefore not required. However, the Project area is currently used by a number of farmers and herders for grazing and winter pastures and as such there may be a negative impact on the ability of local people to maintain the same level of income and access to the area.

According to the results of stakeholder engagement with farmers and government representatives conducted during preparation of the LRP, there are a total of 16 farmers who have farms located within 5 km of the Project Area.

Within a 5 km distance from the outer boundary of the Project Area, there are 16 farmers using land informally in the regional area. Five of the farmers do not use the Project land and are therefore not impacted. This leaves 11 farmers who graze their animals in the area (identified through stakeholder engagement with local farmers and government representatives). Out of the 11, four have written agreements, none of which are legally valid. The Ministry of Agriculture does not have the authorization to issue lease agreements to farmers as the land has historically (and still is) classified as being for industrial usage only. The only entity that has decision making power over this land is Ministry of Energy, and all documents given by other entities are invalid.

Farmers recruit herders to look after their livestock using verbal (not written) contracts. If a written contract is agreed between a farmer and a herder then they would need to pay tax and potentially provide other benefits, so farmers just provide verbal contracts only. Many of the farmers live on the outskirts of Baku City or Gobustan settlement, leaving the herders to live at the farm in shelters and basic accommodation. These structures are provided and maintenance by the farmer and access is granted whilst the herder is employed. The herder typically stays with his family and provide bedding and basic provisions, with all livestock equipment (fences, enclosures, etc.) being provided and owned by the herder.

All farmers and herders who use the area for grazing are considered to be affected people.

Construction/upgrade of the access road will not reduce the land available for agricultural activities on the basis that the right of way for the road already exists and there is no vegetation present along the existing track.

Based upon the information above, the total number of farmer PAPs comprises 53, of which 21 are women and 15 below the age of 18. Out of the 53 people, 8 households comprising 36 people have been identified as being vulnerable (68%) primarily due to the household having low levels of income or where the household is in substantial debt.

Data from the analysis of herder PAPs indicates a total of 55, of which 25 are female and 21 below the age of 18. Out of the 55 people, 29 have been identified as being vulnerable (55%) with the main reason being unemployment in the household, and the presence of low levels of income.

Overall, the Project will impact 25 PAHs within which there are 53 + 55 = 108 PAPs which includes 65 vulnerable PAHs.

This impact will commence at the start of construction as working areas are fenced off to prevent unauthorised entry inside the site boundary. No impacts to livelihoods are expected to occur in relation to the upgrade of existing Qobustan access roads which will connect the Project area to the main road M2.

It is expected that this will be a long-term impact given the land use restrictions required for the Project. The impact is direct because the local farms will no longer be able to access land inside the Project area during the Project life cycle. The initial change on daily life/routine is expected to be followed up with a rapid habituation reducing to below nuisance level.

The receptor's sensitivities may range from Medium to High, depending on farmers access to alternative land and their vulnerability. Considering a moderate magnitude of impact, the degree of impact (negative) significance is considered to be **Moderate**.

To address this, a **Livelihood Restoration Plan** (LRP) commensurate with the level of impacts expected has been developed and details compensation measures for affected farmers and herders.

Access to the Project site will continue to be restricted during the operation phase although the LRP shall be designed to address the impacts associated with land access restrictions from both the construction and operational stage of the Project.

Human rights risks potentially triggered

- Right to adequate standard of living
- Right to freedom of opinion, information and expression
- Right to access to effective remedies

Local farmers and herders' living standards will be maintained with the development and implementation of recommended mitigation measures, including the LRP. Residents' right to housing will not be affected by the Project as no physical displacement will take place.

A grievance mechanism will be established to enable farmers, herders and communities to exercise their right to freedom of opinion and expression by submitting grievances related to the Project. A grievance mechanism is provided within the Project SEP.

12.5.2 Employment Opportunities and Procurement of Goods and Services

The Project will have direct positive impacts on employment in the area. Local job creation will potentially also lead to indirect employment creation, especially in the service sectors within the district up to regional level. Also, local procurement of goods and service especially during construction is expected. The anticipated related impacts are as follows:

- Temporary jobs during the construction phase of the Project.
- Indirect job creation from service and supply jobs to meet demands from resident workforce. The presence of construction workers in the Project area may enhance the local economy through their purchase of local goods.
- During construction, local materials suppliers/traders for raw materials and general transportation services may benefit from this Project.

- Potential to fail to meet community expectations for job creation due to a) lack of suitability of local candidates, especially during construction and b) during the transition from construction to operations will be managed appropriately.

During construction, the number of workers at site will vary according to the activities that are being undertaken. The number of people that are predicted to be employed during construction varies depending on the EPC Contractor however it is expected to reach a peak of around 420 personnel. After the peak level has been reached, the local workforce will gradually be reduced leading up to the start of operations.

The construction workforce is expected to consist of a combination of nationals and expatriate workers. The majority of workers will be local people preferentially sourced from the towns and villages within the district up to regional level (but largely around 30 minutes' drive from the Project site). This includes technicians and low-skilled personnel who will receive various levels of training before starting work on the project. The exact division of locals to non-locals will be determined following appointment of the EPC Contractor.

The overall workforce will include three categories of workers (the number of categories, and if they are local or incoming is not currently known):

- Category 1: low-skilled (hired by sub-contractors rather than the EPC Contractor).
- Category 2: skilled (hired by EPC Contractor).
- Category 3: expatriates (hired by EPC Contractor and the Company).

The individuals employed, especially during construction, and their household members, will benefit from increased income. However, so that local people can benefit from these new job opportunities – especially long-term operations jobs – investments in training will be required. The Project represents an opportunity for young people to increase their skills through vocational training that will be of use to them after their involvement in this Project is completed. Individuals who receive such training should be able to seek alternative work within the construction sector in the future. Vocational training is likely to include training on electrical installation, ground civil works, basic HSE and site safety, and other topics.

Additionally, the Project will positively influence the local and regional economy during construction from the direct procurement and supply of materials and services from companies based locally but mostly at district or regional level due to the remoteness of the Project area.

The positive impact due to Employment Opportunities and Procurement of Goods and Services is short-term as construction works are expected to continue for a period of approximately 18 months. Potentially, training provided can have longer term durations. The sensitivity of receptors is considered to be high as local employment during both construction and operations is a key expectation amongst local villages (Gobustan and Alyat) and their representatives.

There is an opportunity for women to become part of the low-skilled and skilled workforce, benefitting from the vocational training and earned income, as well as opportunities for disabled people. This has the potential to work towards inclusive economic growth and increase the ability of women to influence decisions in the households associated with spending decisions. During engagement, some of the women in the households were keen to apply for temporary positions but would need assistance with application forms due to a lack of literacy. There may be challenges associated with attracting equal numbers of job applications from men and women, due to cultural constraints. To overcome this, female Project representatives will be used undertake engagements in farmer and herder households and discuss with household representatives about the fact that the workplace will be suitable for the presence of women, and that women should actively apply for temporary employment positions available from the start of construction.

Due to the cultural differences between genders in relation to local employment, it is clear that the process used to recruit both male and females requires careful planning and engagement, so that equal opportunities are given to both genders, and the risk of tensions rising in households over differences in opinion are reduced.

During construction there is a risk that violations of labour rights take place within the supply chain. This could include the use of forced or child labour, the exploitation of workers through excessive working hours, poor working terms and conditions, the absence of written worker contracts, and the lack of a worker grievance mechanism that can be used to raise concerns with senior management.

There have been international media reports in 2021[7071] associated with allegations associated with the use of forced labour camps to manufacture photovoltaic panels, from the Xinjiang province in China. On 15 July 2021, the United States Senate passed a bill to ban all products from China's Xinjiang in the form of a Weak or Forced Labor Prevention Act[72].

During construction, the increased employment / economic opportunities and the wages earned by local construction workers are likely to result in a beneficial impact of minor magnitude since temporary and expected to have minor perceptible change in local household living standards considering characteristics of the AoI. Given the receptors sensitivity, the impact (positive) significance during construction is expected to be **Moderate**.

During operation, the number of local people that are to be employed by the Company is expected to be up to 50. A significant percentage is expected to be comprised of national people. There will be less opportunities with significant decrease in workforce requirements, also less ongoing development activities requiring local services. Also, as the Project transitions from construction into operation, there will be a shift in the skills required. The Project might thus create limited business opportunities for local and regional economy in this phase. The impact magnitude is negligible as the workforce required during operations is relatively small when compared to the construction stage. As such, the significance of impact (positive) is considered **Minor to Negligible** during operation.

Workforce retrenchment and demobilization and business contract termination will also create potential adverse impacts on community livelihood and local economic, but also indirect impacts of decreased demands of goods and services from non-local workforces.

[70] Fears over China's Muslim forced labor loom over EU solar power. 2021. POLITICO. Available at: https://www.politico.eu/article/xinjiang-china-polysilicon-solar-energy-europe/

[71] Apple Did Business With A Wind Energy Company That Has Close Ties To Xinjiang. 2021. BuzzFeedNews. Available at: https://www.buzzfeednews.com/article/meghara/apple-xinjiang-wind-power-labor

[72] U.S. Senate passes bill to ban all products from China's Xinjiang. Reuters. Available at: https://www.reuters.com/world/us-senate-passes-bill-ban-all-products-chinas-xinjiang-2021-07-15/ [Accessed 15 July 2021].

High expectations for jobs for the local communities will need to be continually managed from the early stages to avoid unrealistic Project expectations. A **Construction Labour and Working Conditions Management Plan** will be developed including local hiring plans to maximise the number of local employees on the Project. It is essential that the local recruitment process is adequately managed and seen to be transparent, involving the active participation of local and regional stakeholders. This will be in line with IFC PS, EBRD PR, ADB Safeguard Policy and ILO.

Human rights risks potentially triggered.

- Right of work
- Right to enjoy just and favourable conditions of work
- Right to equality before the law, equal protection of the law and non-discrimination
- Right not to be subjected to slavery, servitude or forced labour
- Right to freedom of opinion, information and expression
- Right to access to effective remedies
- Right to adequate standard of living

The Project **Construction Labour and Working Conditions Management Plan** will be developed to elaborate commitments on terms of employment. Also, specific clauses will be included and implemented through: awareness training on non-discrimination and gender equality for workers and facilitation of gender-neutral facilities on site; training and zero tolerance policy on harassment; explicit clauses on equal protection and treatment of people. Additional measures including promotion of employment and training opportunities targeting minority groups will be included. Once measures are implemented, the risk will be appropriately addressed.

The Project will ensure that the prohibition of forced labour on the Project site and supply chain is enforced, including regular control and monitoring of workers and working conditions, and protection of labour rights for migrant workers.

An internal grievance mechanism will be established to enable workers to exercise their right to freedom of opinion and expression by submitting grievances related to the Project. Workers' grievance mechanisms will be developed as part of the Project's ESMS.

Adequate measures have been recommended in the ESIA to maintain and monitor as well living standards for workers housed on site or in nearby settlements during Project phases.

12.5.3 Social Infrastructure and Services

The presence of workers from outside the local area during construction could have an impact on local social amenities and possibly saturate existing public services (water, electricity, health centres, etc).

While there might be a temporary pressure on these amenities in the short term, there may also be a positive impact on infrastructure development in the longer term. The Project is also expected to improve the condition of road infrastructure in the area through upgrade of Project access road associated with the construction and operational phases.

Impacts on local recreational uses of the land in terms of change in land use and sense of place have been addressed under Chapter 5 – Landscape and Visual Amenity.

Presence of Workers and Accommodation

The Project will provide temporary accommodation for some construction workers from outside of the local area. There is the potential for up to 30 people to reside on the Project site for security / positions requiring overnight attendance. If this is required, there will be no additional land take required for provision of accommodation on the Project site. This will all be within the fenced area of the Project.

The majority of people working during construction will be from the local area (within a 30 minute drive) and transportation will be arranged for these workers to the Project site each date. The small number of non-local people will be housed in rented accommodation in the form of an existing hotel or similar type of accommodation facility.

Females based in the accommodation facility shall be able to dine in a separate area compared to the men, separate sleeping and washing areas shall be used, and a separate prayer room shall be provided. Details of the Worker Code of Conduct and Worker Grievance Mechanism shall be placed at various locations within the accommodation facility so that the standard of behaviour required is clear, and workers are able to raise a concern at an early stage, should they wish to do so. Prior to construction, both the accommodation on site (if required) and rented accommodation will be reviewed in line with EBRD / IFC's Guide for Workers Accommodation[73].

[73] EBRD and IFC publication: Workers' Accommodation: Processes and Standards, 2009

The owners and employees of hotels and accommodation facilities if used will directly benefit through increase business revenue and profits (identified in the impact above). On the other hand, there is a potential capacity saturation for the provision of local public services and their facilities, such as health facilities for construction workers. Local communities may be impacted differently depending on their dependence to those services and the actual location of the worker accommodation. Given the small scale of non-local people, it is not expected to be significant.

The negative impact of an increased workforce population, albeit small numbers, may create some pressure on existing social infrastructure will be most felt during the peak period of construction activities. This would increase the risk of adding pressure to medical resources and existing public services (water, electricity, health centres, etc). However, the impact is short-term as construction works are expected to continue for a period of approximately 18 months. In addition to this, there is the risk of increases in transmissible diseases including COVID-19 putting additional pressure on facilities and services (with additional risks of transmission to local communities).

The impact magnitude is Low as the workforce is likely to represent a small perceptible change to the communities in the AoI but not at the regional level and only on a temporary, short-term basis. The sensitivity is low as the potential small delay of access to public services may be harder for some receptors to adapt than others. Given the potential benefits that are achievable, the impact significance is assessed as **Moderate** during construction, even if possible initial change on daily life/routine is expected to be followed by a rapid habituation if mitigation measures are put in place.

It is anticipated that the continual presence of limited number of workers during the operational phase of the Project will have a negligible effect on the demand for medical care and local services in the district. Thus, the impact during operation is considered **Negligible**.

Infrastructure Development

The Project will involve the upgrade of part of the existing access road in the area. This will improve access for farmers, particularly after construction and will aid access to the cemeteries in proximity to the Project.

Furthermore, the Project will add 230 MW generating capacity to Azerbaijan existing renewable energy capacity. Impact is positive because the operation of the Project will be contributing towards the ongoing development of the country in terms of potential for renewable energy development and economic diversification. The impact will occur at a regional and national level as energy shall be injected into the national grid. The local communities shall not be provided with electricity as this is the responsibility of the offtaker.

Consultation as set out in the SEP will be carried out to forewarn local people and users of the cemetery in close proximity to the Project of upcoming construction activities and deliveries scheduled as so far as possible to avoid conflict with tourists and visitors to the local cemeteries.

The impact is assessed as positive in the long term with short-term minor negative impacts due to potential conflict with road users during construction.

Human rights risks potentially triggered.

- Right to health, food, water and sanitation

Utility water for the Project site will be delivered to site by truck and stored in proper water tanks. Thus, the Project will not affect local residents' access to water which represents an issue in the area. Generally, implementation of the mitigation measures identified will sufficiently address risks to local communities' rights to access local social services ensuring right to health, water and sanitation.

12.5.4 Community Health & Safety and Security

The construction phase activities such as installation of solar PV panels, construction of substation and movement of material and personnel may result in impacts on the health and safety of the community as follows:

- Dust and engine emissions created by construction activities could impact air quality and hence community health.
- Movement of material and personnel via the access roads may result in damage to local communities or livestock due to accidents.
- Influx of workers in the Project area could result in a change in the disease profile of the local population with potential spread of transmissible diseases including COVID-19.

Equipment and activities will create noise and vibration during construction and could create disturbance for farmers. This is addressed in Chapter 10 (Noise and Vibration). Any consideration regarding accidental water/soil quality impacts due to potential leakages or releases have been covered under Chapters 7 and 8.

Road Safety

As mentioned under Chapter 11, the Project construction activities will lead to additional traffic and increased risk of traffic-related accidents and injuries to the community. However, prior to mitigation, the addition of vehicles to the roads is expected to result in a **Moderate** increase in the risk of traffic accidents on both local access road and highway prior to mitigation. Injury or death from traffic impacts is a direct negative impact that will be localised and short term, occurring during construction phase only and considered negligible during operation.

Injury or Death from Construction Activities and Unforeseen Events

Risks to community health from construction activities such as accidents, chemical releases or such are low given that, prior to construction, the Project area will be fenced off and security in place.

Respiratory Effects from Poor Air Quality (Dust)

Construction activities may result in fugitive dust. It can be generated by vehicle traffic on unpaved roads, naturally occurring windblown dust from disturbed lands and dust generated during construction activities.

Impacts will vary depending on the construction activity and the severity of most air related impacts reduce with distance from the source. Fugitive dust will have the greatest potential impact on communities close to the site, and farmers who use land close to the site.

This could result in respiratory impacts for the local farmers, ranging from minor irritation of the throat, eyes, nose to chronic irritation, asthma and other respiratory effects.

Unmitigated respiratory effects from construction activities would be direct, negative impacts that are localised but short to medium term. With mitigation these effects would become localised and **Minor**. No impact is expected during operation.

Spread of Food and Water-Borne Diseases

Increased population due to the arrival of workers to the area, may increase pressure on local waste management and sanitation services and infrastructure. This is within an area that is currently not serviced by municipal sewer systems or waste collection services (high sensitivity thus considered).

Hence, it is possible that Project activities generating waste, if not carefully managed, could result in contamination of groundwater or surface water. Poor waste management practices also could affect livestock health in the area adjoining the Project site.

The impact (negative) significance is assessed to be **Moderate** during **construction,** while **Negligible** during operation.

Influx of Workers

The rapid increase in population from the incoming workforce may increase the risk of introducing and spreading communicable diseases. The risk of disease outbreaks (including sexually transmitted diseases, HIV/AIDS etc.) is typically associated with demographic changes and labour migration. This risk is possible both during the construction and operation phases, even if, during the construction phase, it may be relatively higher because of the higher number of workers, the presence of a workers' accommodation camp and the possible higher rate of foreign workers.

Additionally, it is fundamentally important that the Project fully considers the COVID-19 risks as communicable respiratory diseases will most likely be the most significant concern for potential interactions between the workforce and community members. A detailed assessment will be undertaken once the EPC has been appointed based on the pandemic conditions at the time of construction. The IFC / EBRD Migrant Workers Covid-19 Briefing Note (July 2020) and Interim Advice for IFC Clients on Preventing and Managing Health Risks of COVID-19 in the Workplace will be followed when developing management measures prior to construction.

In addition to this, women, particularly young girls are at risk from the presence of the incoming workforce who may try to seek sexual services. Interactions between incoming workers (likely to be male) and women (in addition to increasing the incidence of communicable diseases) may raise tensions and increase the prevalence of gender-based violence.

If workers interact with local people outside of working hours, there may also be the potential for increased tensions and incidence of crime in the local area. During construction, there is also the potential for people to turn up from outside of the area seeking employment and other economic opportunities which could result in increased crime and harassment of women, given these opportunists would largely be male.

The influx of workers an indirect negative impact, which will be local and short to medium term. The impact magnitude is Medium because the potential for workers to travel outside their accommodation when they are not working and interact with local residents is likely to happen. The sensitivity is Medium as the local communities may be able to adapt to this change depending on the actual location of worker accommodation. Depending on the workforce composition, vulnerable worker population may be more sensitive to avoiding or treating communicable diseases, and this will have to be identified as a priority during the planning stage. The impact (negative) significance is assessed to be **Moderate** during **construction,** while **Negligible** during operation.

Security

The Project's site security measures will comprise a perimeter fence equipped with barbed wire to prevent intrusion. No armed security will be required for the Project, but security will be in place and a Security and Human Rights Management Plan developed prior to construction (see Section 12.5.4). Security arrangements at the Project site will be developed in accordance with relevant IFC Guidance.[74]

There is the potential for security personnel to use excessive force that results in intimidation or even physical damage, acting as a trigger event to further potential conflicts and Human Rights (HR) risks. The impact is largely reversible with the proper HR training.

Conflicts between workers of different nationalities or different employers may also occur, including any harassment of females, workers from different ethnic groups, or on other grounds should not be excluded. A Code of Conduct will be compiled to govern the behaviour of Project personnel.

[74] IFC, 2017. Good Practice Handbook on the Use of Security Forces: Assessing and Managing Risks and Impacts. Report available at: https://www.ifc.org/wps/wcm/connect/ab19adc0-290e-4930-966f-22c119d95cda/p_handbook_SecurityForces_2017.pdf?MOD=AJPERES (28 Aug 2018)

The potential impact during construction is considered to be **Moderate** adverse, pre-mitigation. It is expected that HR training and implementation of Code of Conduct will reduce this to Minor.

Related human rights impact

- Right to health
- Right to life, liberty and security

Potential risks to local residents' health include temporary noise impacts during the construction phase, traffic incidents, air pollution, waste/wastewater poor management and risks associated with influx of the workforce. The ESIA has identified mitigation measures that will sufficiently address risks to local communities' rights to health.

No security events or significant unrest has been noted within the last years in the Project's AoI. Also, the Project will employ a private security company and measures to maintain and oversee the behaviour of security personnel such as the development of a security personnel Code of Conduct and mandatory training on human rights and cultural sensitivity. Once implemented, the risk to right to life and security will be appropriately addressed.

12.6 Mitigation and Enhancement Measures and Residual Impacts

12.6.1 Land Acquisition and Economic Displacement

The following mitigation measures will be implemented throughout the construction and operation phase:

- Farmers and herders who experience a loss of livelihood shall be compensated in accordance with EBRD and ADB policy requirements and they shall be eligible for livelihood restoration measures. The proposed livelihood restoration measures include the provision of animal feed and / or water for a period of five years, drinking quality water calculated at 2 litres/per day/per person to all of the PAPs in the PAH, provision of building materials for livestock keeping and improving shelters and provision of solar panels or a diesel generator to provide power. These options are detailed further within the LRP.
- Appoint a Community Liaison Officer (CLO) to communicate with the stakeholders including all herders present. Provide detailed and regular information to local community members about Project activity to mitigate community concerns as a result of misinformation, in compliance with Project SEP.

- Establish ongoing communication with the land users (i.e., herders) as per Project's SEP, including through additional signage throughout the Project site and in neighbouring villages and roads, posting of the Project's contact details in accessible locations to facilitate submission of grievances, and regular contact with herder representatives via phone or face-to-face meetings when possible due to COVID-19 restrictions.
- Establish a grievance mechanism to receive and address specific concerns of stakeholders, particularly the land users within a defined period of time.
- Reclamation of the land will be conducted to backfill and restore native vegetation.
- Through implementation of the above-mentioned mitigation measures, potential impacts to herding livelihood activities will be sufficiently managed also during operation. The SEP will be used to manage the grievances and problems that may arise for the herders, while the LRP will include ongoing provisions for support during the operations phase. Grievance logs will be kept and evaluated periodically, and the need for additional mitigation measures will be identified as necessary through consultation with the herders.
- During construction and operations, the Project Company will design and implement a **Community Development Plan (CDP)** that aims to provide a range of benefits to people in local communities in the vicinity of the Project, and to off-set residual impacts associated with land use change and land access restrictions.Residual impacts are expected to be of **Minor** to **Negligible** significance with implementation of the above mitigation.

12.6.2 Employment Opportunities and Procurement of Goods and Services

The following mitigation measures will be implemented throughout the construction and operation phase:

- Communicate employment estimates, timeframes and skills requirements clearly to the stakeholders on a continuous basis.
- Expectations associated with local employment will be managed through provision of timely and accurate information and provided to local communities via engagement specified in the **SEP.**
- Invest in skills training to enable greater employment of local population throughout Project life, for both construction and operations phases. Training will commence ideally as early as possible prior to construction to ensure local people have appropriate skills for employment on the Project site.

- A **Labour and Working Conditions Management Plan** will be developed detailing labour management requirements, roles and responsibilities, equal opportunities, reporting procedures, monitoring and training measures to be implemented (as per the above bullet point).
- During engagement, some of the women in the households were keen to apply for temporary positions but would need assistance with application forms. There will be a commitment in place within the **Labour and Working Conditions Management Plan** to provide support for people applying for positions, especially women.
- Prior to construction, women from affected farmer and herder households will be specifically encouraged to apply for a temporary employment positions and additional support shall be provided to encourage the application of females. Support includes use of a female Company representative to engage with local women to inform them that the workplace will be suitable for the presence of women and additional measures will be in place (such as a Code of Conduct, etc.) and women will be able to approach female managers should they wish to raise a concern about harassment or any other matter.
- The **Labour and Working Conditions Management Plan** will include details of local hiring to maximise the number of local employees on the Project. This will be in line with IFC PS, EBRD PR, ADB Safeguard Policy and ILO. This sub-plan applies to the Project Company and the Contractors (including sub-contractors and third-party consultants).
- Equal opportunities will be provided to both genders, and therefore the risk of tensions rising in households over differences in opinion will therefore be reduced. A **Gender Management Plan** will be developed in this regard prior to construction.
- During operation, in order for the businesses that have lost income or had to downsize due to the magnitude of supply decreasing in comparison to the construction phase to prepare for this situation, regular and continuous information will be provided.

To address the potential for labour violations to occur within the supply chain, a Contractor and Supplier Management Plan shall be developed including supply chain procedures. This shall include details of:

- How the requirements of the Company's human resources policies and procedures (including the Worker Code of Conduct) shall be applied to all Tier 1 major suppliers. This includes specific measures to prevent gender-based violence and harassment amongst the workforce.
- All primary (Tier 1) major suppliers will be pre-qualified by the Project Company before a contract is placed for the supply of materials and services. The process to become a pre-qualified supplier to the Project will include an assessment of the supplier's existing human resources policies and procedures (including those on child labour, forced labour, occupational health and safety, bullying and harassment in the workplace), management system controls and monitoring activities on their own workforce.
- A register of all Project suppliers will be maintained so that a central record is available of the companies involved, and the types of materials or services that they are providing.
- The Project Company will use this register and information provided during the pre-qualification process, to conduct a risk assessment of labour violations occurring within the supply chain. For example, labour violations within the provision of construction aggregate materials, has a higher risk of violations compared with a company providing accounting services. It is also recognised that small to medium enterprises (SMEs) have a higher risk of non-compliance with regards to labour violations (such as child labour) and poor occupational health and safety controls.
- Using the results of the above risk assessment, additional actions (such as audits, review of supplier's audit and inspection records, etc.) may be undertaken to check the adequacy of existing controls and monitoring activities. For this purpose, a sub-contractor monitoring procedure shall be developed as an appendix to the Supply Chain Management Plan which includes a checklist that will be used on suppliers considered to be high-risk.

- The Project Company's Environmental and Social Management System will include details of the minimum specifications of working conditions and worker recruitment, including controls to avoid forced and child labour. The contracts between the Project Company and all suppliers will include legally binding obligations for them to undertake their contracted scope in accordance with the ESMS (this includes adherence to ADB standards/policy requirements). This is important, as if a legally binding obligation is not present, then it can be challenging to persuade suppliers to improve their worker conditions.

With regards to the general concerns about potential labour violations within the supplier of the photovoltaic solar panels, this risk was identified during the early tendering stage and he Companys requirements have been clearly defined and specified during the procurement process. Standard controls which have been and will continue to be applied include:

- Mubadala Code of Conduct.
- Mubadala Supplier Code.
- Mubadala Ethics & Compliance Program.
- LONGi Green Energy Co. Code of Conduct for LONGI Suppliers (Nov 2020).
- The Company and their EPC Contractor to only work with approved suppliers.

Enhancement measures to expand the positive, long-term, impacts of Project employment:

- Investigate local sourcing and procurement opportunities to promote sustainable small business development.
- Create positive impact on the local economy by ensuring the procurement from local sources. This will be formalised through a **Contractor and Supplier Management Plan** which will identify measures to be taken to identify local suppliers and prioritise procurement from such parties.
- Work with local vocational training schools and active NGOs to develop curricula which will qualify local students to better meet the needs to the developing solar industry locally.

12.6.3 Social Infrastructures and Services

The following mitigation measures will be implemented throughout the construction and operation phase to reduce potential impacts relating to social infrastructure and services:

- Any workers accommodation provided is to be in accordance with the IFC and EBRD Guidelines on Worker Accommodation[75]. A dedicated **Worker Accommodation Management Plan** will be developed prior to construction by the EPC contractor, following the EBRD / IFC guidance.
- Development of workers' health and safety procedures ensuring appropriate wash and sanitary facilities for workers with regular cleaning of workers accommodation and Project site facilities required. These measures will be set out in the **Occupational Health and Safety Plan** and **Workers Accommodation Management Plan.** This will assist with reducing worker illnesses / injuries and reduce pressure on local services as a result.
- Provision of a dedicated medical professional to be employed by the Project. Details will be set out within the **Occupational Health and Safety Plan**.
- Provide a mobile medical centre nearby the Project site for the provision of first aid in line with the IFC / EBRD Guidance Note on Worker's Accommodation Standards.
- Implement measures to ensure access to local cemeteries around the Project site is not adversely affected by the fencing of the Project area (refer also to Chapter 9 of the ESIA). Such measures may include providing alternative routes, which can be accessed by pedestrians as well as vehicles.

Providing that the measures determined are implemented for the construction phase especially, the increased pressure on local social infrastructures and services will result to be manageable and significance minimised.

Enhancement measures to expand the positive, long-term, impacts of the Project on improvements in social infrastructure include:

- Investing in local social infrastructure, including health care facilities, to meet the needs of the community in partnership with local government and in accordance with community demands as established from public consultation activities (refer to suggestions reported in section 12.3.14), without seeking to supplant or replace the role of the government in providing social services. Proposed measures will be assessed and further detailed in a **Community Development Plan** prepared for the Project.

[75] IFC and EBRD (2009)

12.6.4 Community Health & Safety and Security

The following mitigation measures will be implemented throughout the construction and operation phase:

- Community health and safety measures will be included within various management plan documents including the **TTMP, CEMP, Security and Human Rights Management Plan**, elements of the **Occupational Health and Safety Plan (OHSP)** and an **Emergency Preparedness and Response Plan (EPRP).** These plans will include the potential hazards of the Project during construction and operation to local communities and how these will be controlled. Community health and safety mitigation measures associated with the use of land surrounding the site for grazing purposes to ensure safe access to pastureland surrounding the Project area, especially during construction will also be set out.
- Communicate Project risk to local communities and address concerns accordingly. Monitor any complaints filed via grievance redress mechanism.
- Warning signs indicating the presence of the Project along access roads (to be installed during both construction and operation) to inform local people of the dangers posed by the Project.
- Fencing will be in place around the Project site at the start of construction and remain for the life of the Project which will reduce the potential for accidents due to people crossing the Project site.
- Development of a risk assessment to determine appropriate COVID-19 controls to be implemented. This will be dependent, to an extent, on COVID-19 conditions prior to construction. Further information is provided in the Influx of Workers section below.
- Develop an **EPRP.** Details of the nearest hospital, ambulance, fire station and police station will be identified in the Plan, along with details of the procedure for the medivac of workers who need hospital treatment. A copy of the EPRP will be shared with the relevant authorities so that the approach for a coordinated response is clear and can be actioned following a major incident, and the associated roles and responsibilities.

Road safety / Respiratory Effects from Poor Air Quality

- Provide appropriate traffic safety training to all drivers (employees and contractors) as part of their induction and on an ongoing basis. Provision of safety measures, construction of crossings, pedestrian lanes and strengthening precautionary measures on the roads will be investigated where deemed required.

- Implementation and compliance with a **TTMP** which will identify the strategies used to manage dust on the road during the execution of the Project, as well as the use of properly maintained vehicles and construction equipment with emission controls (refer to Chapter 11 of the ESIA).
- The caution signs will be set at the vicinities of the entry points from the M2 highway to Qobustan road up to the Project site. Flagmen will be available at the entry-exit points of the Project Site.

Spread of Food and Water-borne Disease

- Implementation of the **Hazardous Materials and Waste Management Plan**, to ensure that Project waste is managed, recycled where possible and disposed of in line with local regulation and international best practices.
- Effluent will be stored in a septic tank or untreated storage tank and removed and disposed of periodically by a licenced contractor to a licensed disposal facility.
- The Company / EPC will ensure all required licenses / permits are in place where third party wastewater/waste disposal & transport companies are to be utilized and that they facilities are audited to ensure that they are fit for purpose.
- Ensure there is proper and adequate sanitation facilities at the Project site during construction.
- **Workers Accommodation Management Plan** will include hygiene and sanitary requirements to be followed within the workers accommodation to reduce the potential for water and food-borne diseases. All drinking water will meet local or World Health Organisation (WHO) drinking water standards.

Influx of Workers

- Develop and implement Project specific COVID-19 management measures that details necessary actions and mitigations to be taken during Covid-19 pandemic. The workers' accommodation will also implement COVID-19 prevention measures. The mitigation measures to avoid and reduce risk exposure will be implemented as detailed in the Interim Advice for IFC Clients on Preventing and Managing Health Risks of COVID-19 in the Workplace (IFC, 2020). These measures will be set out in **Occupational Health and Safety Plan, Workers Accommodation Management Plan** and **Labour and Working Conditions Management Plan** as appropriate.
- No employment at the construction gate / work sites.

- Ensure health screening is being conducted for employees and contractors before contracting workers and on a periodic basis throughout their employment/contract.
- As part of health and safety induction for workers, provide awareness training on communicable disease prevention. Provide this training on an ongoing basis.
- Identify opportunities to support local public health campaigns that focus on prevention of communicable diseases.
- Influx management procedures will be set out in relevant management plan documents prior to construction including a **Labour and Working Conditions Management Plan, Security and Human Rights Management Plan, Worker Accommodation Management Plan** and **SEP** as appropriate. Procedures will be in line with the relevant aspects of the WB Guidance on Influx Management (2006) and IFC's Project and People: A Handbook for Addressing Project-Induced In-Migration (2009).
- New arrivals will be monitored to establish if influx is occurring during construction and, if this is the case, additional resources will be provided to support communities and newcomers informed of no employment opportunities.
- The grievance mechanism will be monitored for any grievances raised relating to the conduct of workers, conflict or harassment. Any such grievances will be documented, investigated, and addressed in coordination with relevant stakeholders.

Security

- A **Code of Conduct** will be compiled to govern the behaviour of Project personnel and security guards. This will be set out in the **Security and Human Rights Management Plan** and **Labour and Working Conditions Management Plan** prepared prior to construction.
- Project Workers will be provided with training on **Code of Conduct** and internal HR policies as well as potential interactions, conflicts, the community's sensitivities, culture, local traditions, communication and behaviours to prevent any potential conflicts.
- Ensure that all potentially affected stakeholders know how to contact the company and to file grievances or concerns about security arrangements.

- No armed security will be required for the Project, but security will be in place and a **Security and Human Rights Management Plan** developed prior to construction. Security arrangements at the Project site will be developed in accordance with relevant IFC Guidance.[76]
- The **Security and Human Rights Management Plan** will detail the **Code of Conduct,** roles and responsibilities, site access procedures and register, security incident management procedures and registers, qualifications and training requirements will be prepared prior to construction.

The efficient implementation of all required mitigation measures and the development and implementation of all recommended management plans will reduce the impact significance to a **Minor to Negligible** level.

[76] IFC, 2017. Good Practice Handbook on the Use of Security Forces: Assessing and Managing Risks and Impacts. Report available at: https://www.ifc.org/wps/wcm/connect/ab19adc0-290e-4930-966f-22c119d95cda/p_handbook_SecurityForces_2017.pdf?MOD=AJPERES (28 Aug 2018)

13 Cumulative Impact Assessment

From an international perspective, cumulative impacts are defined within the IFC Good Practise Handbook on Cumulative Impact Assessment (CIA) as "*those that result from the successive, incremental, and / or combined effects of an action, project or activity when added to other existing, planned and / or reasonably anticipated future ones*". While a single activity may itself result in an insignificant impact, when combined with other impacts (significant or insignificant) in the same geographical area and occurring at the same time, it may result in a significant cumulative impact.

The potential for cumulative impacts are likely to arise where:

- Two or more projects are visible from the same locations.
- Delivery of construction materials takes place at the same time using the same roads for two or more projects.
- Two or more projects take place in nearby locations resulting in increased pressure on services.
- Two or more projects take place in nearby locations resulting in increased number of construction workers required from the local area or where larger numbers of workers are brought in from outside the local area.
- Two or more projects could interfere with migratory routes or wildlife movement.
- Two or more projects take place in the same area which both put pressure on the availability of alternative land.
- As noise and dust impacts are generally localised, only projects that are in very close proximity are considered to contribute to any cumulative effect.

Those considerations have been taken into account when developing the current 230 MW Solar PV Project CIA.

13.1 Assessment Methodology

The CIA process is defined by IFC as (i) analysing the potential impacts and risks of proposed developments in the context of the potential effects of other human activities and environmental and social drivers on the chosen Valued Environmental and Social Components (VECs) over time, and (ii) proposing concrete measures to avoid, reduce, or mitigate such cumulative impacts and risk to the extent possible.

Cumulative impacts can occur (a) when there is "spatial crowding" as a result of overlapping impacts from various actions on the same VEC in a limited area, (e.g., increased noise levels in a community from industrial developments, existing roads, and a new highway; or landscape fragmentation caused by the installation of several transmission lines in the same area) or (b) when there is "temporal crowding" as impacts on a VEC from different actions occur in a shorter period of time than the VEC needs to recover.

The process needs to identify the overall impacts which may arise from a group of projects and distinguish the contribution of each individual project to these. The identification and management of cumulative impacts have been limited to those effects generally recognized as relevant based on expected potential impacts and/ or concerns of affected stakeholders. To this end, the existing and future developments located in the Project's AoI (buffer area of 5 km radius from the Project Site) have been considered as defined at the time the impacts identification process is conducted.

As defined by IFC, a six-step process has been undertaken for the CIA purposes:

- Step 1 – Determine spatial and temporal boundaries of the analysis and identify VECs.
- Step 2 - Identify other existing or planned developments within the assessment boundaries and related environmental and social drivers which would have potential impacts on the VECs.
- Step 3 - Establish information on baseline status of VECs.
- Step 4 - Assess cumulative impacts on VECs.
- Step 5 - Assess significance of predicted cumulative impacts.
- Step 6 - Use the mitigation hierarchy to design management strategies and to propose mitigation and monitoring programs aimed at addressing significant cumulative impacts on selected VECs.

13.2 Assessment Process and Results

13.2.1 Step 1– VECs, Spatial and Temporal Boundaries

The spatial boundary of the CIA study is determined as to cover the Project's AoI including the Project access roads, the Project site, and its surrounding buffer area of 5 km radius.

The temporal boundary of the CIA study is determined as the timeframe from the beginning of land preparation activities in 2021 until the end of the PV Plant operational lifetime (23 years from the licensing date). The Plant is planned to be fully operational in 2023, with the construction period lasting for approx. 18 months from end of 2021.

As reported in the Table 13-1 and shown in Figure 13-1, the VECs considered for the CIA within the established Project's AoI are mainly part of physical features, ecosystem values, socio-economic conditions, cultural aspects, and infrastructures.

Table 13-1: Identified specific VECs

Environmental / Social Aspect	Valued Environmental and Social Components - VECs
Landscape and Visual Amenity	- Visual environment from farmlands and scattered buildings (i.e., sheep and cattle farms). - Visual environment from touristic spots such as "Gobustan Rock Art Cultural Landscape" National Park and World Heritage Site (WHS). - Visual environment from mud volcanos touristic area.
Soils	- Local soil resource.
Biodiversity	- Migratory and congregatory bird species of high conservation value as potentially present or passing within the investigated area. - Habitat mostly formed of ephemerals (semidesert plant communities, such as bushes wormwood and saltwort species), shrubs and halophytes (characteristic of steppe flora). - Terrestrial fauna of moderate sensitivity
Archaeology and Cultural Heritage	- Qobustan National Park, officially "Qobustan Rock Art Cultural Landscape" World Heritage Site. - Cemeteries (Gara Atli cemetery and Khanali cemetery). - Cultural habits and aesthetic values. - Undiscovered archaeological finds (burial mounds)
Social receptors	- Farmers/herders using the area for informal grazing of cattle.
Infrastructures	- Qobustan Access road - Social Services

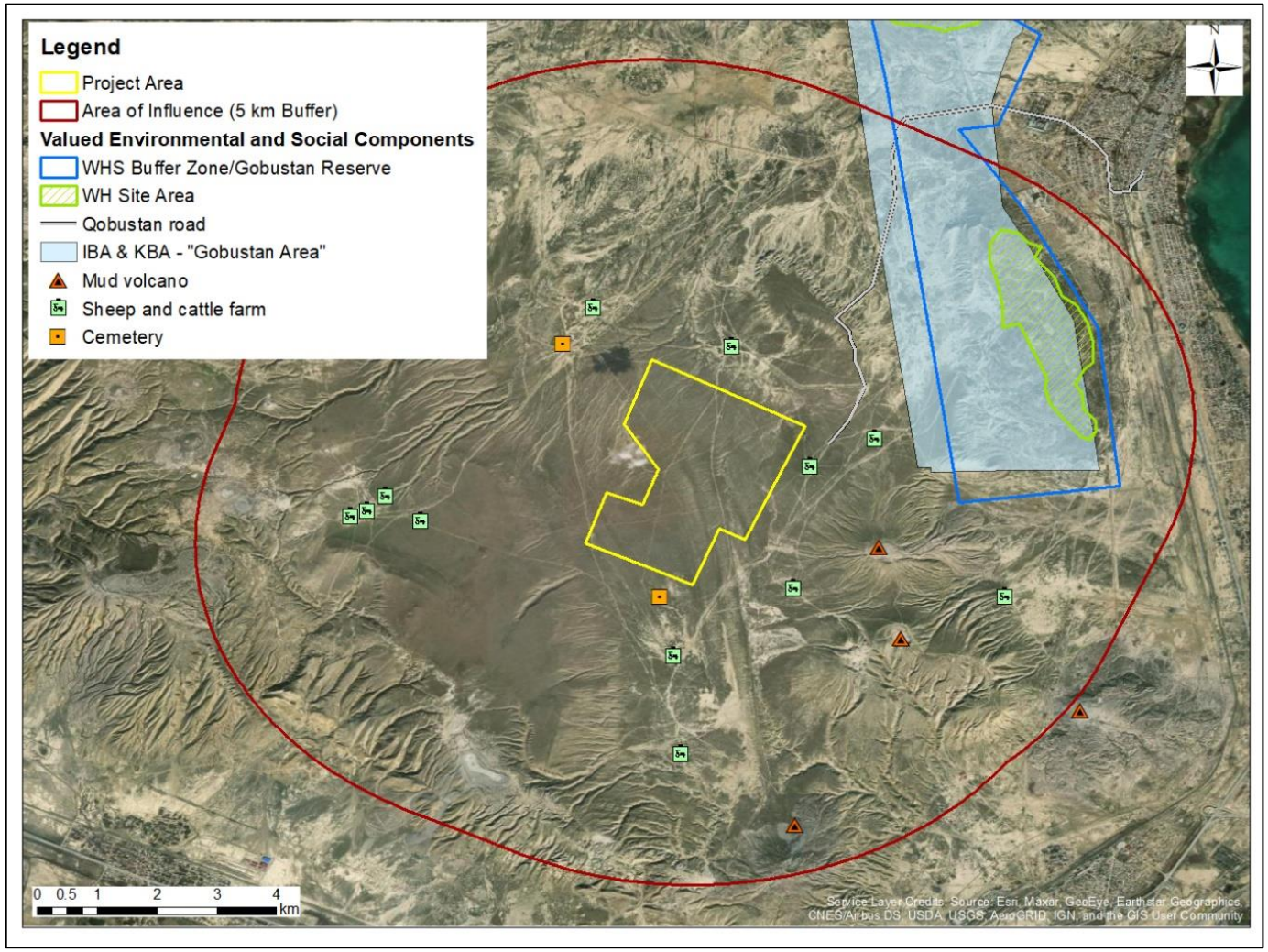

Figure 13-1: Location of the identified VECs within the Project's Area of Influence

13.2.2 Step 2 – Other Developments & related Environmental & Social Drivers

Other existing and foreseeable developments and associated environmental and social drivers within the spatial and temporal boundaries of the CIA Study, which would have potential impacts on the VECs, have been identified based on field survey findings and outcomes of stakeholders' interviews.

Neither large-scale industrial developments nor other existing or planned solar PV developments have been identified within the Project's AoI. Available information on the existing developments identified within the CIA boundaries are provided in the following table, while the location of these developments with respect to the Project site shown in Figure 13-2.

Table 13-2: Identified developments within the CIA boundaries

Project Owner/Proponent	Development Description	Distance from the Project Site	Project Phase
Azerenergi	OHL development spanning around 55 km from the Project site to Janub power plant (PP) in Shirvan City.	Directly adjacent to Project and spanning 55 km to the south-south-west.	It is expected that the OHL will be constructed prior to commissioning of the Solar PV plant.
Agency of Roads of Azerbaijan Republic	Ongoing construction of a new highway with 8 m wide asphalt concrete coating, 21 km long, leading from the Gobustan settlement to the Arabani mud volcanoes located Northwest to the Project site. The purpose of the construction of the new road is to facilitate the access of the local population and tourists to a future tourist complex approx. 12 km from the Project site. A 15km section of the road has already been built and made ready for asphalt-concrete pavement.	New highway running approx. 3.5 – 4.0 km far from the Northern border of the Project site.	It is expected that the new road will be completed before the commencement of Project activities.

Project Owner/Proponent	Development Description	Distance from the Project Site	Project Phase
State Oil Company of the Republic of Azerbaijan (SOCAR)	The construction of the "Babek-Umid" underground gas pipeline with a diameter of 1000 mm, running from Dashgil gas field to Sangachal terminal, has been completed. The pipeline trenches have been backfilled, the topsoil has been restored, an operational road running parallel to the pipeline has been built, and appropriate gas fittings and warning signs have been installed. However, a temporary construction camp is still in place, where operators are testing the pipeline and completing the final commissioning.	Gas pipeline running approx. 1 – 6.0 km far from the Eastern border of the Project site. Temporary construction camp located approx. 4.5 – 5.0 km North to the Project site.	Commissioning stage

Project Owner/Proponent	Development Description	Distance from the Project Site	Project Phase
Gobustan Operating Company (GOC) and State Oil Company of the Republic of Azerbaijan (SOCAR)	The Project site is located in the Southwest Gobustan Contract Area, an onshore oil field in Azerbaijan. This field occupies 604 km^2 and consists of three blocks: coastal, central, and northern. The Project site, before the land allocation for the construction of the PV Plant, belonged to the coastal block for onshore exploration, development and production of oil and gas by GOC and SOCAR. No oil and gas wells are located within the Project site. However, in the vicinity of the Project area, there are abandoned, and operating wells owned by GOC. No information is available regarding new potential planned wells within the Block. Potential for further O&G wells to be developed in the Block cannot be excluded	The Project site is located within the coastal O&G concession block.	Both abandoned and operating wells

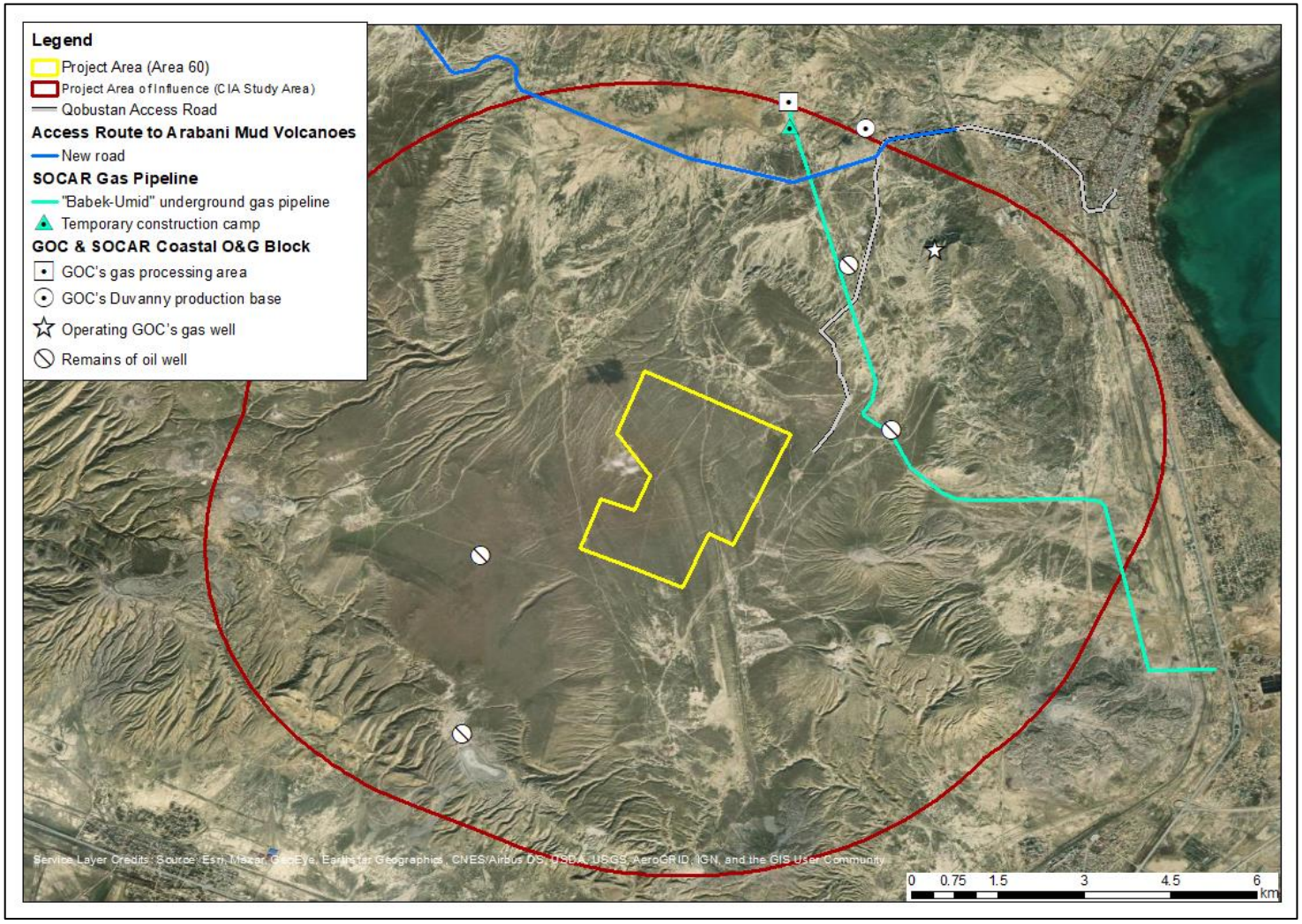

Figure 13-2: Location of other developments identified in the CIA Study Area

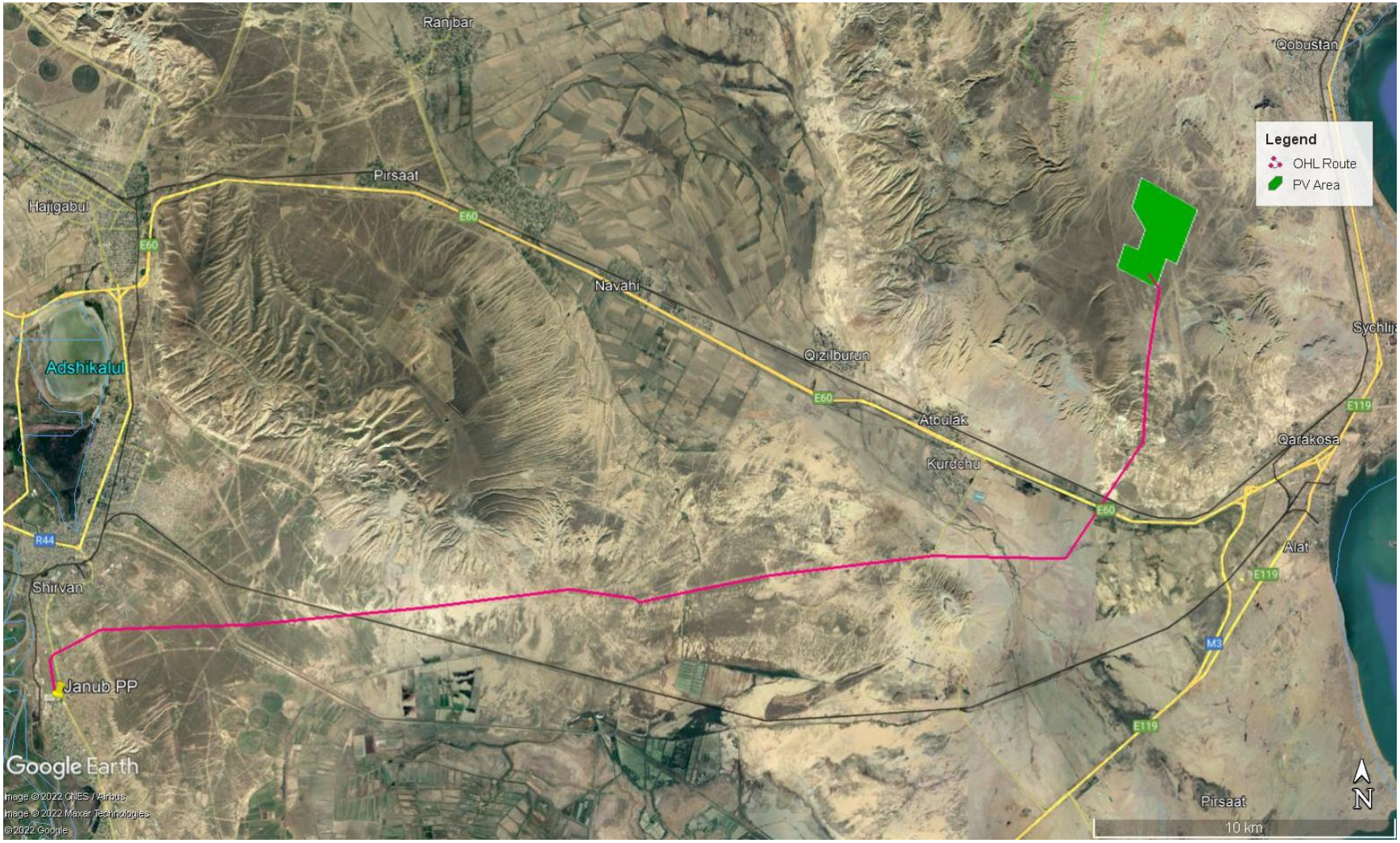

Figure 13-3: Location of the OHL

13.2.3 Step 3 – Baseline Status of VECS

Information on the baseline status of the VECs identified in the CIA boundaries are presented in Chapter 5, Chapter 6, Chapter 9, Chapter 10, Chapter 11, and Chapter 12 of this ESIA.

13.2.4 Step 4 – Assessment of Cumulative Impacts on VECs

Analysis of cumulative impacts on VECs involves estimating the future state of the VECs that may result from the cumulative impacts they experience because of existing or foreseeable developments, as well as those from natural environmental and external social drivers.

The cumulative impact potential on the VECs has been evaluated considering the projects affecting the VECs along with the planned PV Plant Project. If a VEC is found likely to be affected by one or more Projects in addition to the Project, a potential cumulative impact on that VEC has been recognized (Table 13-3). Considering the existing/operational developments identified in the CIA boundaries, potential for cumulative impacts is anticipated on soils, biodiversity, archaeology and cultural heritage, noise and vibrations, and socio-economic conditions.

It should be noted that this CIA is restricted to the level of readily available information gathered through public consultation with relevant stakeholders and site visits performed on site.

Table 13-3: Cumulative impact potential of the identified existing and future developments on the VECs

Environmental / Social Aspect	Specific VECs	Project Under Assessment	Existing / Future Projects				Potential for Cumulative Impact
			Azerenergi OHL to Janub PP	New road to Arabani mud volcanoes	SOCAR gas pipeline	Coastal O&G Block wells	
Landscape and Visual Assessment	Farmlands/ Pasturelands	X	X				Yes – increased impacts on the landscape.
	Gobustan National Park Designated Area	X					No
	Mud volcanos touristic area	X	X	X			Yes - it is likely that the new road and OHL would be visible from the touristic area.
Soils	Local soil resource	X	X	X	X	X	Yes – increased potential for erosion phenomena in the area. Potential for accidental spills
Biodiversity	Migratory and congregatory bird species	X	X				Yes – potential increased impacts resulting from potential disturbance / injury and risk of collisions with OHL.
	Habitat/ semi-desert vegetation	X	X		X	X	Yes – increased potential for habitat loss or degradation for terrestrial flora species
	Terrestrial fauna	X	X	X		X	Yes – increased potential for disturbance and injury

Environmental / Social Aspect	Specific VECs	Project Under Assessment	Existing / Future Projects				Potential for Cumulative Impact
			Azerenergi OHL to Janub PP	New road to Arabani mud volcanoes	SOCAR gas pipeline	Coastal O&G Block wells	
Archaeology and Cultural Heritage	"Qobustan Rock Art Cultural Landscape" World Heritage Site	X			X	X	Yes – increased potential for disturbance to local touristic values
	Gara Atli cemetery and Khanali cemeteries	X					No
	Intangible assets (herders or local farmers engaged in traditional livestock, funeral practices, living traditions & religious practices)	X	X	X		X	Yes - increased potential for disturbance to local intangible assets
Noise and Vibration	Sheep and cattle farms	X	X	X		X	Yes - increased potential for disturbance
Infrastructures	Qobustan access road	X					No
	Social Services	X	X		X	X	Yes - increased potential for additional pressure
Social receptors	Herders using the area for informal grazing of cattle	X	X		X	X	Yes - increased potential for pressure on the availability of alternative land

13.2.5 Step 5 – Assessment of Significance of Predicted Cumulative Impacts

Based on the approaches suggested by IFC and the CIA limitations, the significance of cumulative impacts has been evaluated not in terms of the amount of change, but in terms of the potential resulting cumulative effects to the VECs assessed.

The results of the cumulative impact assessment are mainly to be linked to potential physical interference between the considered developments, given the proximity of the developments' footprints. It is worth mentioning that cumulative impacts are mostly expected during the construction phase of the Project, as during the operational phase only routine maintenance activities will be undertaken.

Table 13-4: Significance of Cumulative Impacts

Environmental / Social Aspect	Specific VECs	Project Under Assessment	Existing / Proposed Projects				Significance of Potential Cumulative Impact
			Azerenergi OHL	New road to Arabani mud volcanoes	SOCAR gas pipeline	Coastal O&G Block wells	
Landscape and Visual Assessment	Farmlands/ Pasturelands	X	X				**Minor** The introduction of the OHL into the landscape will result in increased landscape and visual impacts relating to the farmland / pasturelands. Impacts are not predicted to be significant alongside the Project.
	Tourists / Visitors	X	X	X	X	X	**Minor to Moderate** The introduction of the OHL into the landscape will result in increased landscape and visual impacts relating to the tourist / visitors at the mud touristic area. This is considered in the context of the presence of the solar PV project and existing road that is present.
Soils	Local soil resource	X		X	X	X	**Negligible** The new road will be completed by the start of Project construction. The pipeline trenches have been backfilled; the topsoil has been restored. Potential for leakages unlikely. Potential for further O&G wells to be developed in the Block cannot be excluded, assuming no wells will be developed in the right proximity of the solar PV site.

Environmental / Social Aspect	Specific VECs	Project Under Assessment	Existing / Proposed Projects				Significance of Potential Cumulative Impact
			Azerenergi OHL	New road to Arabani mud volcanoes	SOCAR gas pipeline	Coastal O&G Block wells	
							The OHL should not significantly impact on the soil resource in conjunction with the Project assuming appropriate mitigation / pollution control measures are in place.
Biodiversity	Habitat/ semi-desert vegetation	X	X		X	X	**Minor to Moderate** It is expected the pipeline ROW will be subject to periodical maintenance and clearance thus contributing to habitat loss and fragmentation in the AoI. The OHL will also contribute to habitat loss and fragmentation. Potential for further O&G wells to be developed in the Block cannot be excluded.
	Terrestrial fauna	X		X		X	**Minor to Moderate** Increased potential for disturbance and injury due to additional traffic given by the new operating road in parallel with Solar PV site construction activities.
	Ornithology	X	X				**Minor to Moderate** Potential for disturbance and / or injury to birds as a result of construction and operation of the OHL in addition to the Project.
Archaeology and Cultural Heritage	"Qobustan Rock Art Cultural Landscape" World Heritage Site	X			X	X	**Minor** Increased potential for disturbance to local touristic values and historical archaeological landscape of Gobustan region. Potential for further O&G wells to be developed in the Block cannot be excluded. Maintenance activities at SOCAR pipeline are expected. However, it is unlikely that those

Environmental / Social Aspect	Specific VECs	Project Under Assessment	Existing / Proposed Projects				Significance of Potential Cumulative Impact
			Azerenergi OHL	New road to Arabani mud volcanoes	SOCAR gas pipeline	Coastal O&G Block wells	
							activities will be developed in the same timeframe as construction of Solar PV.
	Intangible assets (herders or local farmers engaged in traditional livestock, funeral practices, living traditions & religious practices)	X		X		X	**Minor** The presence of additional facilities and increased traffic may impact visual character and sense of place into the existing rural landscape
Noise and Vibration	Sheep and cattle farms	X		X		X	**Negligible** It is unlikely that additional activities will be developed in the same timeframe as construction of Solar PV
Infrastructures	Social Services	X				X	**Negligible** It is unlikely that additional activities will be developed in the same timeframe as construction of Solar PV
Social receptors	Herders using the area for informal grazing of cattle	X			X	X	**Moderate** The presence of additional facilities may increase the potential for pressure on the availability of alternative land.

13.2.6 Step 6 – Management of Cumulative Impacts

Since cumulative impacts typically result from the actions of multiple stakeholders, the responsibility for their management is collective, requiring individual actions to eliminate or minimise individual development's contributions. As described from Chapter 5 and Chapter 12 of the ESIA, project specific on-site mitigations and monitoring programmes will be implemented in order to minimise potential impacts of the Project on the environmental and social receptors including the specific VECs identified by the CIA study.

13.2.6.1 OHL cumulative impacts mitigation

To reduce potential cumulative impacts with the OHL, it is proposed to consult with Azerenergji in relation to potential mitigation and scheduling of construction activities including the option to install additional markers on the nearest OHL sections to the Project site which will mitigate potential impacts on bird species colliding with the OHL.

OHL markers are proposed on the sections of line closest to the Project and will be discussed with Azerenergi. These would have the earth wire with 1 lit diverter at every 10m and marking conductors with a 1 lit diverter at 15 m in a staggered way, such that the OHL as a whole has at least one diverter every 5 to 6 m (Wildlife Institute of India 2018 Power-Line Mitigation Measures. Second edition (2020).

The EPC Contractor for the Project will liaise with Azerenergji to determine which roads are proposed for use for development of the OHL and if transportation could interfere with the Project's traffic movements during construction and other road users. If overlaps occur, the projects will consider measures to reduce conflict. Consultation and stakeholder engagement has taken place as part of this ESIA to obtain feedback and understand any concerns in relation to the OHL this includes consideration of tourist / visitors in the consultation process. Details are set out in the SEP for this Project. Communications will continue with the Project Company and Azerenergji to understand any potential issues or grievances which arise as a result of the Project's development alongside the OHL. Community engagement activities will be carried out to ensure that local communities and farmers / herders are aware of potential H&S risks and construction activities (including scheduling) associated with both the Project and the OHL.

14 Climate Change Risk Assessment

14.1 Introduction

This chapter forms the Climate Change Risk Assessment (CCRA) for the Project to ascertain on-going and expected changes in climatic patterns and an evaluation of the climate-related physical risks and transitional risk (as appropriate). Furthermore, a greenhouse gas (GHG) emissions calculation is also provided.

The CCRA provides a high-level review of the following aspects:

- The current and anticipated climate change risks, transition and / or physical as defined by the Task Force on Climate-related Financial Disclosures (TCFD), of the Project's operations.
- The plans, processes, polices and systems required for the Project to manage these risks (i.e. to mitigate, transfer, accept or control).

The assessment will also include a review of the Project's compatibility with Azerbaijan's national climate commitments.

14.1.1 Applicable Requirements

On 18 November 2019, the Equator Principles Association published version four of the Equator Principles (EP4). The changes, which came into effect on 01 July 2020 are to be implemented on any new Projects signed on/after 01 October 2020, include substantive new requirements in relation to climate change.

The revised EPs introduced the requirement to carry out a CCRA for all Category A and, as appropriate, Category B Projects, aligned with the Climate Physical Risk and Climate Transition Risk categories set out in the Recommendations of the TCFD. Due to the nature, location and scale of this Project, it is considered to fall under Category B as discussed in Section 1.5 of the ESIA.

The CCRA guidance also details the requirement for GHG emissions calculations to be included. GHG emissions considerations are also set out in the following guidance:

- IFC PS3 & EBRD PR3 (pollution prevention and abatement).
- EBRD protocol for assessment of greenhouse gas emissions (2017)[77].

[77] https://www.ebrd.com/documents/admin/ebrd-protocol-for-assessment-of-greenhouse-gas-emissions.pdf

- Guidelines for estimating greenhouse gas emissions of Asian Development Bank projects – additional guidance for clean energy projects (2017).[78]

14.2 Risk Assessment

14.2.1 Overview

The CCRA presents an overview of the global and regional climatic trends, an assessment of the Project's GHG emissions and an evaluation of climate-related risks for the Project.

The risk assessment reviews the climatic patterns over the Project location and surrounding area over recent years including changes in temperature, precipitation, wind and hazardous climatic events. Projected trends are set out for the coming years up to 2100 with a risk evaluation undertaken detailing physical risks in line with TCFD recommendations.

14.2.2 Baseline Information

With a population of around 10 million (2020) and CO_2e emissions per capita of 5.7t, Azerbaijan is one of the less energy-intensive economies in Europe[79]. The largest GHG emissions, on average, in the country are placed within the energy sector at around 75% of all emissions, with agriculture contributing 14%. In recent years, extremely hot weather during some days in summertime is observed[80]. There is a likelihood of potential shifts in climatic conditions due to the country's physical and geographical characteristics. It should be noted that increased water deficiency, air pollution and land degradation could lead to vulnerability in sectors such as agriculture and human health.

14.2.2.1 Legislative background

The Republic of Azerbaijan became a member of UNFCCC (United Nations Framework Convention on Climate Change) in 1995 and endorsed the Kyoto Protocol in 2000. Although Azerbaijan is a non-Annex I country, its responsibilities are developing, fulfilling, and publishing national and regional programs attempting to decrease the impacts of global climate change. The country signed the Paris Agreement in 2016. In terms of policies applicable to climate change, the following should be noted:

[78] https://www.adb.org/sites/default/files/institutional-document/296466/guidelines-estimating-ghg.pdf

[79] Azerbaijan - EU4Climate

[80] https://www.ohchr.org/Documents/Issues/ClimateChange/Impact/Azerbaijan.pdf

- Azerbaijan has also adopted the Strategy of Development of Renewable and Alternative Energy Source in 2012-2020 and a strategy for renewable energy 2015-2030.
- State programme for the Socioeconomic Development of the Regions of Azerbaijan for the period 2019-2023 – The policy refers to alternative and renewable sources of energy and priority for the low carbon production sector;
- National Forest Program - This document aims at making forestry activities and related governmental policies sustainable over the period 2015-2030 and more generally in the long term. It notably highlights the role of forests in climate change;
- State Program on Poverty Reduction and Sustainable Development in the Republic of Azerbaijan for 2008-2015 - This Program notably charges the government to design and implement an Action Plan on mitigation and adaptation to climate change in the country over the period 2008-2015. A Carbon Fund will also be established;
- National Program on Environmentally Sustainable Socio-economic Development for 2003-2010 - This Program notably aims at increasing the forest area and protect existing forests in the country. The document emphasises on the fight against desertification and develop strategic objectives.
- Other policies that are being considered include:
    - Azerbaijan 2020 development concept.
    - State programme on poverty reduction and sustainable development.
    - Green economy concept.
    - State programme for the development of industry for 2015-2020.
    - National programme on restoration and expansion of forests.
    - Transport sector development strategy.

Whilst no policy or legal document has been put in place specifically for adaptation, the first Nationally Determined Contribution (NDC) stated that Azerbaijan considers developing relevant adaptation measures for decreasing or minimising potential losses caused by climate change at national, local and community levels by sector[81]. Azerbaijan's first NDC sets a new GHG emission target, which is a 35% reduction in the level of GHG emission levels by 2030 compared to the 1990/base year. Azerbaijan's projected emissions in 2030 result in lower GHG levels than the NDC target.

14.2.2.2 Temperature

Azerbaijan has a continental influenced climate with warm summers and very cold dry winters. Due to its location, there are a variety of climate zones in Azerbaijan. In Gobustan (which is the settlement area of the Karadag district of the city of Baku 5 km east-northeast to the Project site), the warm season lasts for about 3 months, from the end of May to mid-September, with an average daily high temperature above 29°C. The cold season lasts for 4 months, from the end of November to the end of March, with an average daily high temperature below 13°C[82]. Over the course of the year, the maximum temperatures are at an average high of 34°C with minimum temperatures at an average low of 1°C.

The mean air temperature from 1991 to 2000 increased by 1.3°C, which is higher when compared to the 1961 to 1990 average[83].

14.2.2.3 Precipitation

The annual precipitation in the area is 200 mm. In Azerbaijan, the amount of the precipitation decreased over all territories during 1991-2010. This decrease for each season was -4.2mm (-19,8%) in winter, -2.3 (-28.8%) in spring, -1.4 (-23.9%) in summer, -0.4 (-3.3%) in autumn.

The rainy period in Gobustan area lasts for 8.5 months from September to mid-May, with little to no rain for 3.5 months between June and August. The average precipitation per month is set out in Figure 14-1 below.

[81] https://eu4climate.eu/azerbaijan/

[82] https://weatherspark.com/y/104854/Average-Weather-in-Qobustan-Azerbaijan-Year-Round

[83] https://unfccc.int/resource/docs/natc/azenc3.pdf

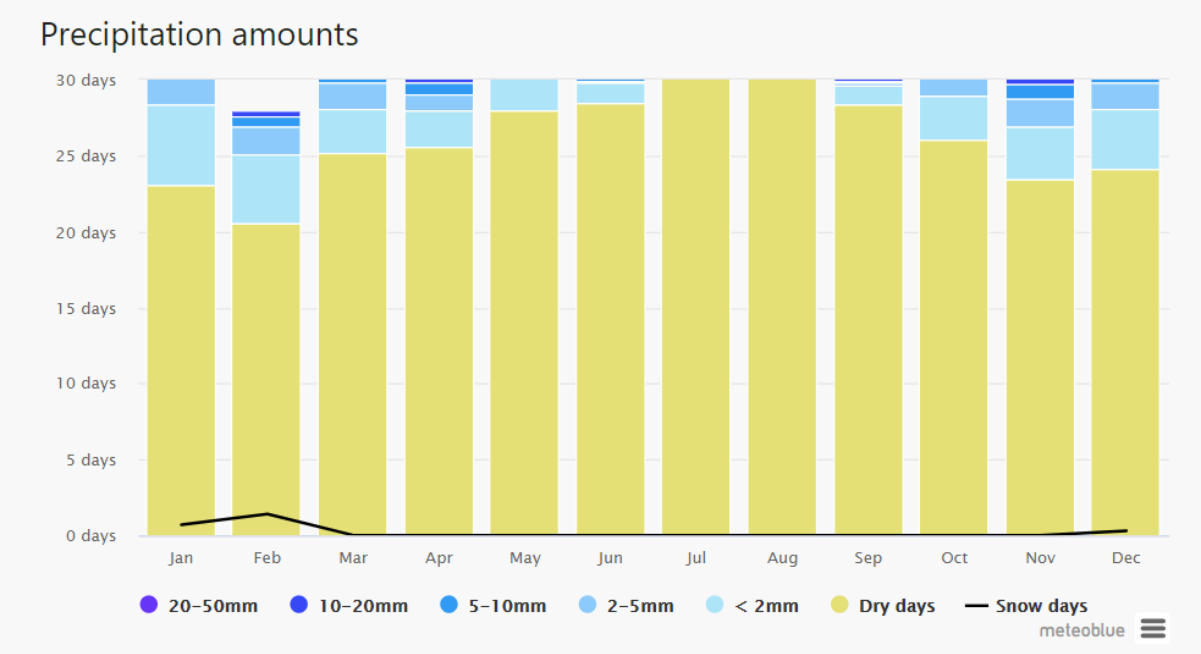

Figure 14-1: Average Precipitation in Gobustan area[84]

14.2.2.4 Wind

The wind speed in Gobustan area varies significantly over the seasons. The windiest part of the year is from June to November, with average wind speeds of around 4.5 m/s (Figure 14.3). The wind direction varies throughout the year, however, is predominantly from the north and east during the year with lower occurrences from the south (Figure 14.2)[85].

[84] https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/qobustan_azerbaijan_585223 .

[85] https://weatherspark.com/y/104854/Average-Weather-in-Qobustan-Azerbaijan-Year-Round

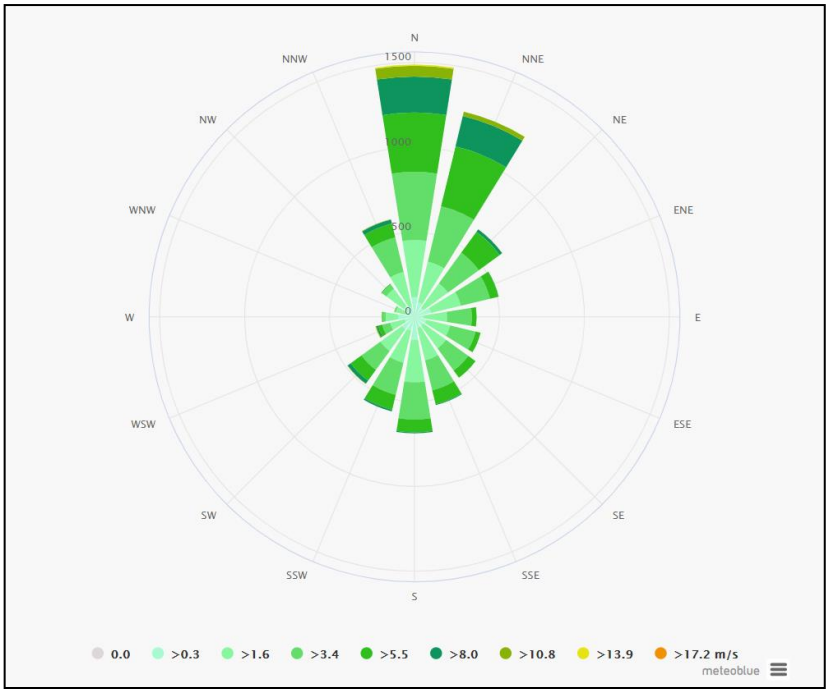

Figure 14-2: Average Wind Speed in Gobustan Area[86]

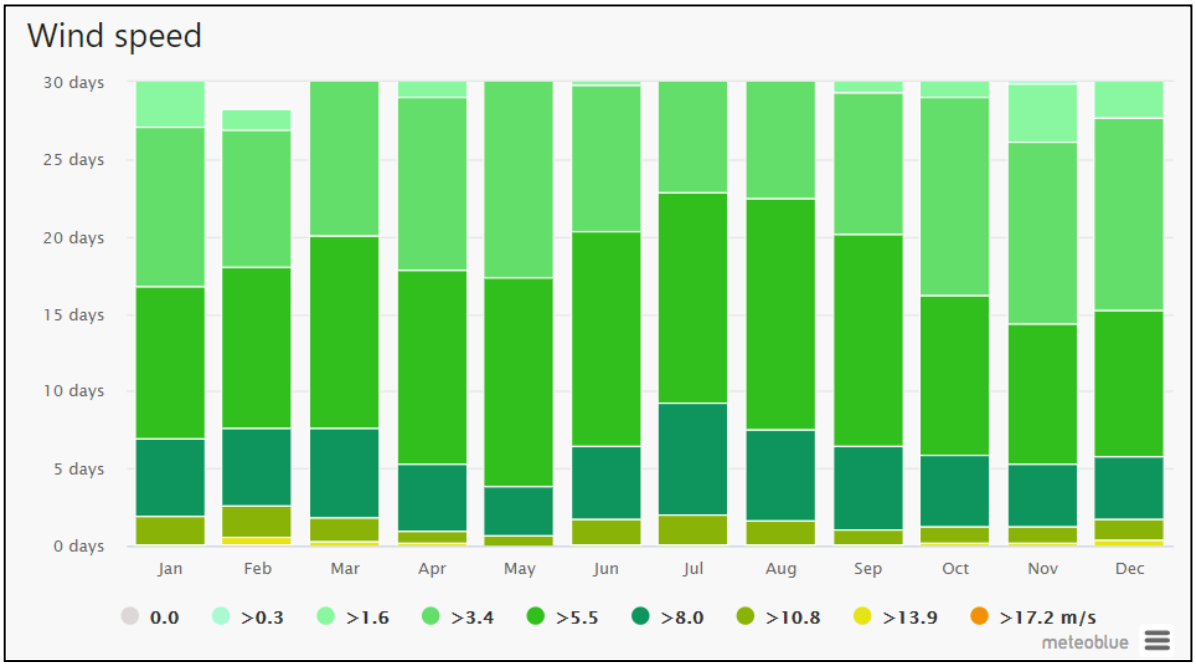

Figure 14-3: Average Wind Speed in Gobustan Area[87]

[86] https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/qobustan_azerbaijan_585223

[87] https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/qobustan_azerbaijan_585223

14.2.2.5 Hazardous climatic events

The most frequent hazardous climatic event in Azerbaijan includes severe winds with heavy rain. In addition, large hailstorms are also frequently encountered. The number of hazardous climatic events have significantly increased over the years. Other natural climatic events include lightning, instances of tornados and avalanches (to a lesser extent).

The European Severe Weather Database (ESWD), managed by the European Severe Storms Laboratory, is a database containing important weather events that can endanger people or make significant damages. The table below sets out the number of severe weather events over the past 10 years according to the ESWD.

Table 14-1: Annual Number of Extreme Weather Events in Azerbaijan

Year	Extreme Weather Event
2010	53
2011	52
2012	64
2013	28
2014	71
2015	47
2016	129
2017	81
2018	84
2019	142
2020	98

As can be seen from Table 14-1, the extreme weather event trend shows and increase in extreme event from 2010 to 2020, with a peak of 142 in 2019. In the last year, extreme weather events related to severe winds, large hail and tornados[88].

[88] https://eswd.eu/cgi-bin/eswd.cgi

Figure 14-4 shows the extent and geographic distribution of extreme weather events in Azerbaijan in 2020.

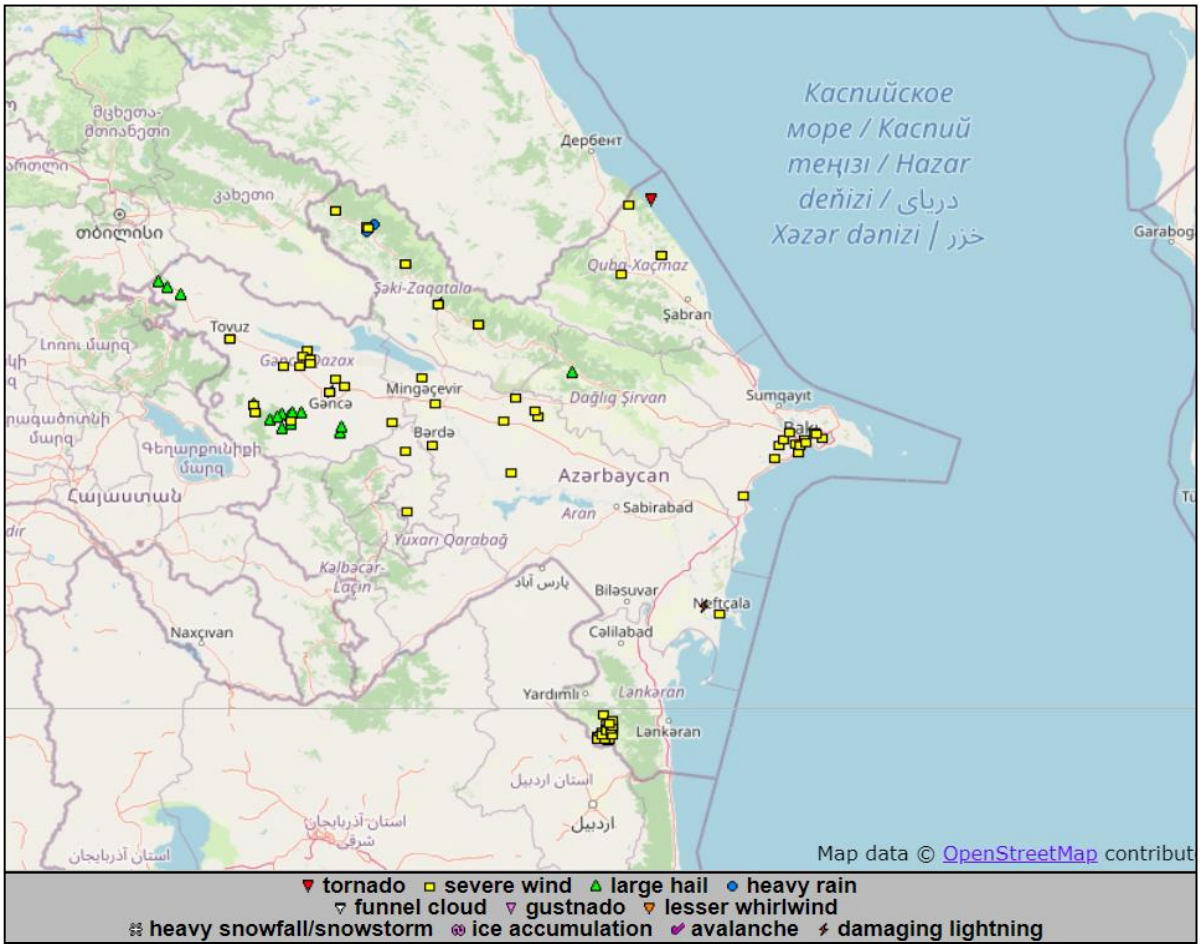

Figure 14-4: Azerbaijan Extreme Weather Events 2020

Figure 14-5 illustrates the extreme weather events near the Project site in 2020. The yellow squares show severe wind events.

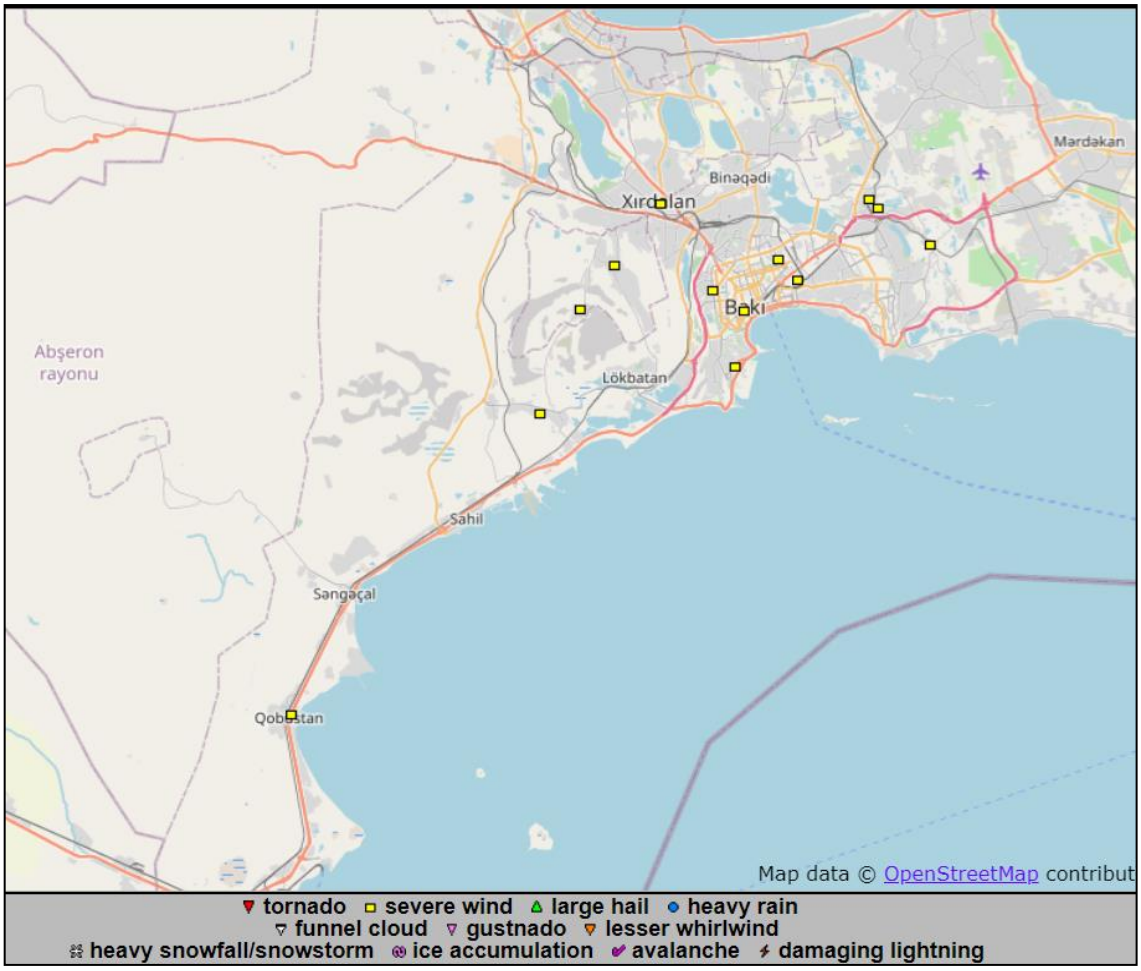

Figure 14-5: Extreme Weather Events near the Project Site in 2020

Azerbaijan has already suffered from natural disaster caused by climate change impact in 2010, when heavy floods affected seven regions and 70,000 people living along the Kura River[89].

[89] https://www.ohchr.org/Documents/Issues/ClimateChange/Impact/Azerbaijan.pdf

14.2.2.6 Predicted Climate Change

The results of climate change modelling forecast an increase of monthly average temperatures in a range of 0.72-1.58°C during 2015-2050 when compared to the average temperatures of 1961-1990. An increase in precipitation in winter (0.4-0.87), summer (2.2-12.4%) and decrease in spring (-0.9 to -1.7%) and autumn (-0.9 to 1.9%), is also expected according to climate change models. The annual change in precipitation forecasted to range between -0.3 to -0.5%[90]. This could also result in reduced water availability and potential periods of drought.

Climate change may reduce water flow in the future with significant changes in the hydrological regime of water bodies. The most dangerous of these are predicted to be catastrophic and flash flooding.

14.2.3 Risk Evaluation

14.2.3.1 Physical risks

The analysis of the observed historical weather data and of the climate projections, indicate that the changes in the climate pattern in the Project area are significant, in line with the average trends for Azerbaijan and the average trends in Europe.

It is possible that the Project will be subject to increasing air temperatures and frequency of extreme weather events in the longer-term as has been the pattern over the last 10 years in Azerbaijan. This could include severe wind events and large hail amongst others.

The rise in air temperatures presents a medium magnitude of change with low to medium sensitivity of the area, resulting in impacts of minor significance. Increases in heavy rainfall events and high winds may damage Project infrastructure thereby causing a high magnitude of change and moderate to major impacts prior to mitigation.

[90] https://unfccc.int/resource/docs/natc/azenc3.pdf

14.2.3.2 Transitional Risks

The evaluation of transitional risks is not appropriate for this type of Project given that electricity is generated from a renewable source and GHG emissions relating to the Project are only due to machinery and facilities used during construction and maintenance and repair activities carried out during operations. These activities are expected to be well below the threshold of 100,000 tCO_2e per year.

14.3 GHG Emissions Assessment

14.3.1 International Requirements

The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related to climate change. It was created to provide policymakers with regular scientific assessments on climate change, its implications and potential future risks, as well as to put forward adaptation and mitigation options. The fifth assessment report was produced in 2013/14 and the sixth report is currently underway, due for release in 2022.[91]

The IPCC first produced guidelines in 2006 for national GHG inventories which were refined in 2019. The aim of the guidelines is to support the preparation of the national GHG inventories by the member countries, by providing default values of emission factors for various fuels and sectors, to allow the quantification of GHG emissions based on national data. The methodologies were updated in 2019.

Further to this, International Finance Institutions (IFIs) such as IFC and EBRD are committed to the reduction of GHG emissions as reflected in their standards and requirements. These are underpinned by the EPs.

In accordance with EPs IV, for projects with Scope 1 (direct) and Scope 2 (indirect) GHG emissions totalling more than 100,000 tCO_2e per year, reporting of GHG emissions must take place. Furthermore, for Category A and - as appropriate - Category B projects, a Climate Change Risk Assessment is required to assess potential physical risks and transition risks (the latter only for projects emitting more than 100,000 tCO_2e per year and so not applicable to this Project). Clients will be encouraged to report publicly on Projects emitting over 25,000 tCO_2e[92].

[91] https://www.ipcc.ch/

[92] www.equator-principles.com

14.3.2 National GHG Emissions Overview

As discussed in Section 14.2 of this ESIA, Azerbaijan's first NDC sets a new GHG emission target which is a 35% reduction in the level of GHG emission levels by 2030 compared to the 1990/base year. Azerbaijan's projected emissions in 2030 will result in a percentage change lower than the NDC target as presented in Figure 14.6.

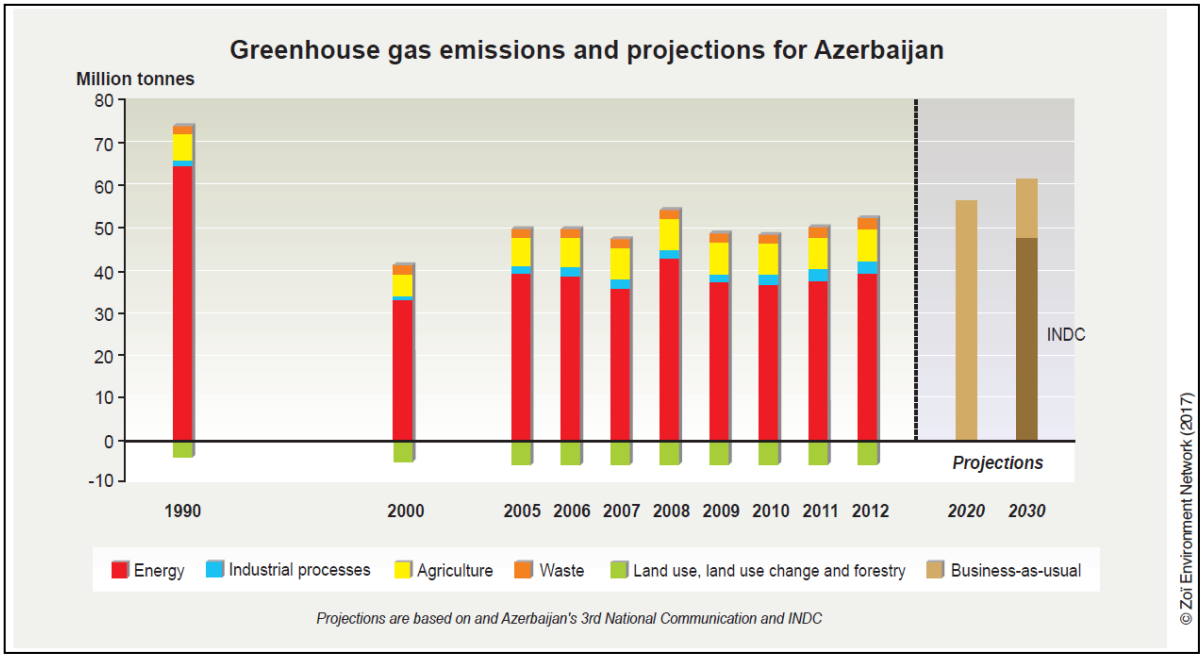

Figure 14-6: GHG projections for Azerbaijan[93]

Azerbaijan's State Statistical Database has calculated GHG emissions from 1990 to 2018, as of 2020. GHG emissions in Azerbaijan in 2018 were 53.6 Mt CO_2 -eq which represented an increase of 5.7% from 2017, however a decrease of 26.9% when compared to the 1990 base level.

The largest GHG emissions in Azerbaijan are from the Energy sector accounting for around 73% of all emissions in 2018 (excluding the land use, land use change and forestry sector). This is illustrated within Figure 14.7 below.

[93] https://issuu.com/zoienvironment/docs/cc-azerbaijan-en

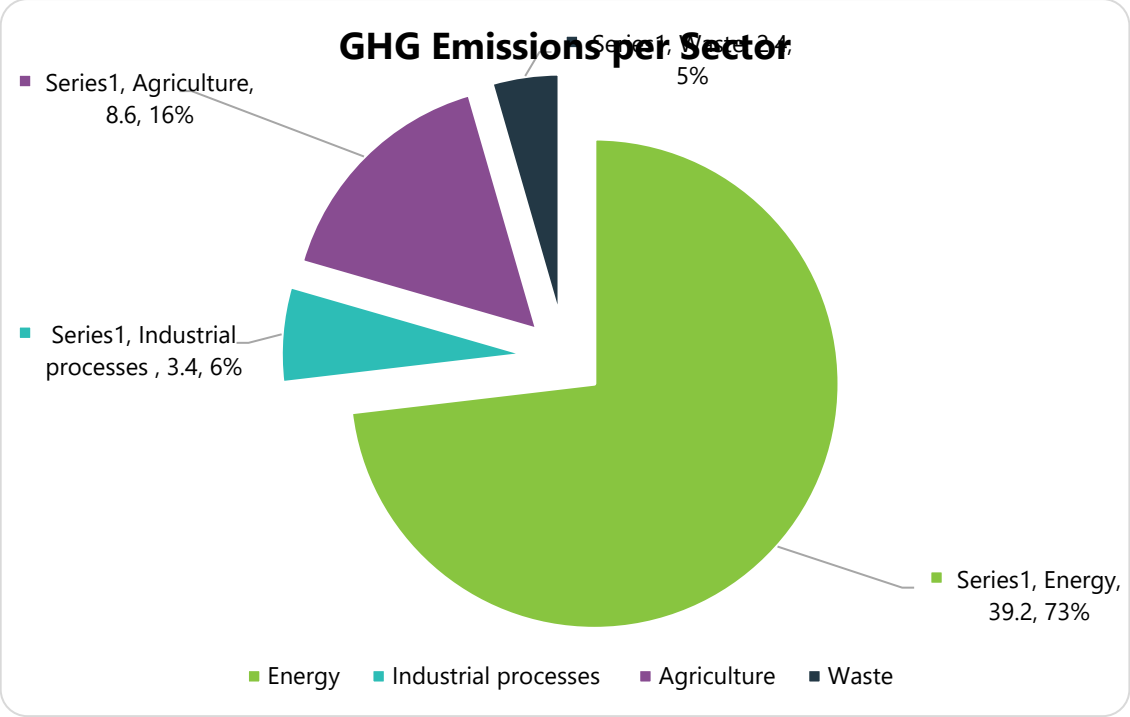

Figure 14-7: Azerbaijan GHG Emission Structure 2018[94] (Source: State Statistical Database, 2020)

Azerbaijan's annual GHG emissions has been relatively consistent since 2008 (Figure 14-8). The annual average percentage difference (year on year) in GHG emissions since 2000 is -1.7%. Since 2000, the annual GHG emissions have been lower than the 1990 baseline year on average by 33.8%, with the highest percentage difference in 2000 (44.3%) and the lowest in 2008 (26.5%).

[94] https://www.stat.gov.az/source/environment/?lang=en

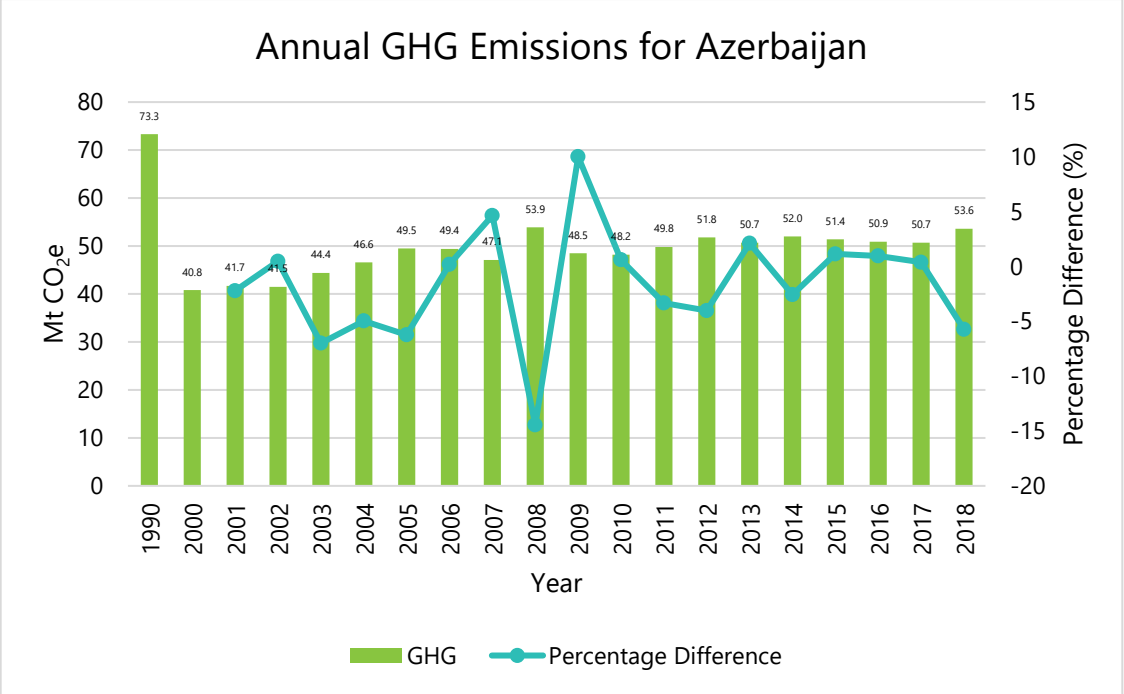

Figure 14-8: Azerbaijan Annual GHG Emissions (Source: State Statistical Database, 2020)

14.3.3 Project GHG Emissions

14.3.3.1 Construction phase

GHG emissions during the construction phase of the Project relate to the use of fuels for aspects such as generators, transport, on-site equipment, and machinery. Although the quantities of emissions have not been calculated, these are expected to be low and significantly less than 25,000 tonnes CO_2 equivalent (t CO_2eq per year) based on previous experience and available literature[95][96].

14.3.3.2 Operational phase

During operation of the Project, there will be minimal GHG emissions, limited to the movement of machinery during maintenance and repair works. Due to the nature of a 230 MW solar PV installation, no emissions will be emitted during operation phase.

[95] Life Cycle Greenhouse Gas Emissions from Solar Photovoltaics (Fact Sheet), NREL (National Renewable Energy Laboratory)

[96] Lifecycle greenhouse gas emissions from solar and wind energy: A critical meta-survey - The Journalist's Resource (journalistsresource.org)

The Project consists of 532,112 PV modules and 50 invertor station units with a capacity of up to 230 MW. This results in a production of 1752 GWh of electricity per year **resulting in a reduction of around 796,637 t CO_2 eq per year**.

14.4 Mitigation

14.4.1 Climate Change

Periods of dry weather and high winds could damage Project infrastructure. It is envisaged that insurance would cover these extreme weather events thereby reducing moderate to high impacts to low. In addition, the potential for dust to be blown onto to solar PVs is higher and may require an increasing effort in cleaning the equipment. The Project is expected to employ advanced technologies that provide for dry cleaning methods.

A rise in air temperatures and irregular rainfall events could impact on water availability. During construction (and also operation, as applicable), water conservation measures will be implemented where it is found to be feasible including recycling of water where possible (for example, use of grey water for dust-dampening measures as required). This will be investigated by the EPC Contractor.

14.5 Residual Effects and Summary

The residual risks associated with climate change to the Project are anticipated to be low with mitigation measures in place. No significant residual impacts are anticipated. In addition, the role the project plays will ensure the country meets its requirement to reduce GHG emissions and achieve the NDC target.

15 Summary of Impacts

Table 15-1 provides a summary of impacts during construction and operation in the absence of mitigation. Mitigation and monitoring measures are set out in Chapter 16 (ESMMP).

Note that the table below is not an exhaustive list of all impacts and mitigation measures. For this, each individual chapter of the ESIA should be consulted.

Table 15-1: Summary of Impacts and Mitigation

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
Visual amenity	VP1: Muslim Cemetery – Sensitivity is considered Low as the view is not considered unique or valuable and magnitude of change is considered negligible. Impacts during construction and operation are therefore assessed as Slight and not significant.	Implement site rehabilitation and landscaping measures to restore the site. This should be implemented in the first available active growing season following the completion of construction. Mitigation options include the development of landscaping and planting proposals within the CEMP to provide further screening. The planting would be developed prior to the operational phase of the development and implemented in the first available planting season following the completion of construction. This will provide some screening to nearby sensitive receptors over the long term to include receptors located in proximity to the Project site. Planting proposed will be sensitive to, and in keeping with, the surrounding landscape. The construction schedule will be developed considering key sensitive features within the landscape including cemeteries, rock art and nearby farm structures. Consultation will be undertaken with relevant stakeholders in relation to the construction schedule. As far as is practicable, the schedule will take into consideration any sensitive events to ensure work is not planned in close proximity to receptors at any sensitive times to reduce visual disturbance.
	VP2: Farm 1 – View is predominately desert. Sensitivity is considered low as it is not considered unique or valuable and magnitude of change is Medium. Impacts are therefore considered Slight and not significant.	
	VP3: Goturdagh mud volcano – viewpoint represents a sensitive environmental element and tourist attraction. Sensitivity of this VP is considered Medium and magnitude of change is considered Medium. Impact is therefore assessed as Moderate and significant.	
	VP4: Qobustan road - The sensitivity of the viewpoint is considered to be Low and the magnitude of change is considered to be Medium. The impact is therefore assessed as Slight as the Project would be a perceptible form but not detracting feature within the view.	

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
	VP5: Gobustan Rock Art Cultural Landscape - The full Project site will be seen across the views from this point however it is noted that the Project will not break the skyline. The sensitivity of the viewpoint is considered to be Medium and the magnitude of change is considered to be Medium during both construction and operation. The impact is therefore assessed as Moderate and significant.	
	VP6: Farm "ID-12" - The sensitivity of the viewpoint is considered to be Low as the view is not considered particularly unique or valuable as it is similar to views experienced across this part of the country. The magnitude of change is considered to be Negligible. The ZTV shows that the Project site is not perceptible from VP6 due topography. The impact is therefore assessed as No Change and not significant as the Project would not be perceptible within the view.	
Landscape character types.	The magnitude of change to the LCTs during construction is Low, as only a proportion of the local landscape will be affected by topsoil stripping and bare ground. The impact period during construction is temporary and medium-term as it will takes approximately 10 months. The significance of impact during construction is Slight and not significant.	Measures include: • Limiting soil damage by keeping the construction areas and roads to a minimum and maintaining strict requirements for vehicles to always remain on the roads.

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
	The sensitivity of the Designated Areas and Mud Volcanoes touristic area LCT is assessed to be High as well as the magnitude of the impact. On a larger scale, the screening is slight due to the topography of the surrounding area and therefore the impact is assessed to be Moderate and significant.	• Reinstating soils where construction areas and roads are no longer required. This would reduce the duration of the visual impact. Mitigation to reduce the adverse impact resulting from litter and garbage (plastic bags, bottles etc.) include: • Provision of adequate facilities for the disposal of garbage. • Training of the workforce in waste management. • Reduce the amount of waste to the maximum extent possible. • Collect all solid waste and store until transported to an appropriate waste disposal facility and disposed. • Organization of clean-ups for existing garbage. These measures will be included within the CEMP, TTMP and Hazardous Materials & Waste Management Plan as appropriate.
	The sensitivity of Farmlands/Rural Areas LCT has been considered as Medium. During operation, the magnitude of impact is likely to be Medium at distances of up to 1 km reducing to Low at further distances. As a result, the significance of the impact is Slight and not significant.	
Ecology - general	The impact magnitude is considered to be Low to Moderate for terrestrial habitat and flora species, as areas of shrubs and steppes that will be affected permanently and temporarily will be limited and the overall integrity of the habitats is anticipated to remain. The impact magnitude is expected to be Low to Moderate for both terrestrial habitat and flora species and so the overall significance of impact potentially generated by construction activities on these receptors is Low to Moderate.	Ensure the Project site is prepared in such a way as to discourage animals from using the Project area. Initial site preparation and clearance could result in the loss of nesting birds and any other breeding species and where possible the initial preparatory work will be undertaken during the non-breeding season. The aim of this work is making the areas of roads and hardstanding unsuitable for species (e.g. ground nesting birds), minimising the likelihood of impact.

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
		A pre-construction survey will be completed for works undertaken in the breeding season to check for animals (reptiles and active bird nests) and, if found, construction activities are programmed to avoid such features until they have been moved or there is a natural cessation of breeding effort. The pre-construction survey will also include a re-check for plant species of conservation concern. In the unlikely event that species listed at IUCN Endangered or above are noted then works will cease until a plan to protect these species has been agreed. This will firstly look to use micro-siting and protective fencing during works to avoid any interference. Where this is not possible, translocation of individual plants to suitable habitat or seed gathering of other plants of the same species and sowing in the area (depending on which is most suitable for the species) will take place. In this scenario, monitoring of the species within the entire area will take place (including full re-survey of the site to look for other individuals of this species) critical habitat will need to be revisited and methods to protect the species, and enhance its population as appropriate, agreed with lenders. Rehabilitation of any cleared areas outside of the footprint of the Project. Potential invasive flora species to be identified and action taken to clear these if they occur in or around areas designated for bush clearance. Mitigation during construction phase includes the following measures:

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
		• To avoid contamination, hydrocarbons will be stored in a secured bunds to be located on impermeable surfaces with controlled drainage away from natural water courses. Bunds should be sufficient to contain 110% of the volume of liquids to be stored within. They will also be roofed to stop contamination of rainwater run-off. In addition, refuelling of vehicles and machinery will only occurs in designated areas. • All hazardous materials must be correctly stored to limit chances of contamination of the area. Generally, it would be advisable to use biodegradable hydraulic oils, where possible. • Wetland areas and riverine systems outside of the Project area, where present, will be left undisturbed during construction. • Project staff require environmental toolbox talks during construction to raise awareness, limit conflict and reduce additional disturbance to terrestrial fauna and avifauna. • Staff should be briefed on risks of exposure to fauna inhabiting the area as well as on preventive measures to be undertaken. Workers in the field will wear protective clothing: long trousers, closed shoes, and leather gloves. Information regarding nearest location of treatment for any bites and stings should be made available. • Any snakes encountered at the site must not be handled or harmed by Project workers. Animals must be relocated by appointed personnel. • Any fauna (not including nests) directly threatened by construction activities will be relocated by relevant personnel.

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
		• The collection, harvesting or hunting of any plants or animals must be strictly prohibited. A 'no tolerance' policy must be adopted with respect to construction and operations workers. Any culprits guilty of poaching must be apprehended. • Fires must be controlled and only allowed in fire permitted areas. Staff training must be carried out in relation to fire safety and firefighting equipment such as fire extinguishers and sand buckets available at every site. • A policy whereby the animals have "right of way" during construction would reduce incidents of conflict. • Should any animals get trapped or be harmed in anyway, the relevant personnel must be informed. • Access roads and substation sites require suitable drainage systems. • Cleared areas no longer required for construction activities will be rehabilitated by reseeding with locally found grasses and shrubs (where appropriate) to increase soil stability. • Construction vehicles must remain on the access roads and not drive in the un-cleared bush. • Checks must be conducted upon construction completion, any areas showing signs of erosion will be immediately repaired. • Any excavated areas must be temporarily demarcated and fenced off to bar access to animals; following the construction phase, those areas need to be re-filled and rehabilitated. Where not possible, tapered sides or a ramp must be in place to allow animals out and checks undertaken prior to filling in.

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
		• Vehicle speed limits must be imposed and adhered to, with the aim of reducing vehicles' dust production and potential for collision with local biodiversity. • Areas where excessive dust is produced will be watered periodically to reduce the amount of dust being thrown up in the air. • Heavy construction machinery will be fitted with mufflers to reduce noise. • Drivers operating in the area must be well briefed and must be aware of the dangers that vehicles pose to the local fauna. These measures will be included in the CEMP, TTMP and OHSP as appropriate.
	The areas directly affected by the Project are relatively small during operation and therefore the magnitude of potential impacts on terrestrial habitat and flora is considered to be Negligible. Given the above considerations and considering that receptor sensitivity is estimated to be Low, the significance of impacts on terrestrial habitat and flora during the operational phase, this is estimated to be "Not Significant".	Operational mitigation measures are set out below: During routine maintenance any invasive flora species will be removed. Cutting is an effective control measure. Measures will be included within the OEMP to ensure that a set protocol is followed to avoid the risk of spread to other areas. Fencing around the Project site should be designed to allow small mammals and fauna to pass safely underneath the area during operations.

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
Ecology – fauna	Due to the nature of the proposed construction works, this is not likely to have significant impacts on the terrestrial fauna populations as a whole, as their diversity within the proposed Project site resulted to be particularly low. Construction activities will be temporary and limited to the Project Site, and the associated impacts will be therefore confined to the AoI. The magnitude of impact is therefore predicted to be Low, as terrestrial fauna species identified as potentially inhabiting the Study Area are those that are found in the larger area, with alternative habitats outside the AoI. Receptor sensitivity is considered Moderate and overall, the impact is expected to be of Low to Moderate significance.	Under Ecology – General row above. Although no tortoises were found in the Project area, there is the potential for the species to be present and therefore a pre-construction check will be undertaken and, if found to be present, the construction timetable will be designed so that excavation work in will be focused around avoiding the most sensitive times (i.e. mid-October to March (or sooner if conditions allow) when tortoises may be hibernating below ground) as well as June and July during aestivation (unless the recent survey data confirms no presence of protected species or there are exceptional circumstances).
	Mammals, Amphibians and Reptiles are likely to be affected by operation through habitat loss/degradation (potentially occurred during the construction phase), increased disturbance, segregation and injury or mortality due to potential conflicts between workers and fauna. The increased disturbance due to presence of people, artificial lighting, noise and dust will be relatively insignificant during operation compared the construction phase, with vehicle movements reduced. The magnitude of impacts during operation is therefore anticipated to be Negligible. Receptor sensitivity is estimated to be Moderate, and therefore impact significance is estimated to be Low.	See above

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
Ornithology	The Project site does not result to be a critical nesting/breeding ground for Critically Endangered or Endangered avifauna species and Project construction phase will be temporary. Therefore, construction activities are not expected to lead to a net loss or reduction in the global or national/regional population of any species and it is likely that any potential impact on these species would be tolerated by the local population. Considering that the receptors' sensitivity is High and the impact Magnitude is expected to be Low, the overall impact significance due to potential habitat loss during construction would be Moderate.	Under Ecology – General row above.
	No impact in terms of population decrease is expected as a result of collision, displacement or barrier effect. Thus, potential negative impacts on avifauna species associated with PV panels glare and resembling water bodies are considered to be of Low Magnitude. However, it is recommended to monitor bird fatalities and panel appearance at the Project Site during operations. Receptor sensitivity is estimated to be High and therefore significance of impact is Moderate.	Under Ecology – General row above and: Any potential bird collisions with the solar panels will be monitored and noted. A bird protection plan will be produced that will provide the protocol for monitoring (which will be standardised, to best international practice and appropriate for detailed analysis of data) will be adaptive so that it can react to changes in noted collisions.
Biodiversity (habitats) – Cumulative	It is expected the pipeline ROW will be subject to periodical maintenance and clearance thus contributing to habitat loss and fragmentation in the AoI.	

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
	Potential for further O&G wells to be developed in the Block cannot be excluded. Thereby impacts of minor to moderate significance are anticipated.	The responsibility for their management is collective, requiring individual actions to eliminate or minimise individual development's contributions. Project specific on-site mitigations and monitoring programmes will be implemented in order to minimise potential impacts of the Project. Consultation with Azerenergji to take place to determine if any mitigation could be applied to the OHL to mitigate potential bird collisions. OHL markers are proposed on the sections of line closest to the Project and will be discussed with Azerenergi. These would have the earth wire with 1 lit diverter at every 10m and marking conductors with a 1 lit diverter at 15 m in a staggered way, such that the OHL as a whole has at least one diverter every 5 to 6 m (Wildlife Institute of India 2018 Power-Line Mitigation Measures. Second edition (2020).
Terrestrial fauna – Cumulative	Increased potential for disturbance and injury due to additional traffic given by the new operating road in parallel with Solar PV site construction activities. Thereby impacts of minor to moderate significance are anticipated.	
Ornithology – Cumulative	Potential for disturbance and / or injury to birds as a result of construction and operation of the OHL in addition to the Project.	
Hydrology & Hydrogeology	Impacts relating to flood and drainage characteristics are considered negligible as the sensitivity of receptors is low and no perennial surface water bodies are present. Water is present only in areas to the north of the site (ephemeral watercourses) and for very limited periods.	On site roads to avoid ephemeral drainage channels where possible. Installation of culverts or other drainage control features where crossings are unavoidable. Supplies provided for cleanup of spills. Pollution prevention and control plan to be developed. Establish a designated storage area is established with an impervious base and impermeable walls.
	The Project will introduce impermeable surfaces to the site area, increasing run off and risk of flooding. This is considered however to be of negligible to minor significance.	

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
Groundwater	The construction activities will not have a direct impact on groundwater; the significance of the impact is assessed as negligible and not significant. This is because the sensitivity of groundwater is low and activities will only affect the shallow soil.	All fuel, oil and chemical storage is stored in a designated secure area. Hoses and valves are checked regularly for signs of wear and ensure that they are turned off and securely locked when not in use. Diesel pumps and similar items are placed on drip trays to collect minor spillages. Trays will be checked regularly, and accumulated oil removed. Surface water will be controlled with appropriate drainage and bunded areas as appropriate. Infrastructure that is most vulnerable to flooding, will be located in areas of lowest flood risk (i.e. areas of solar PV panels will be situated outside of the main flood risk corridors). As far as possible, construction and access roads will be routed outside of areas of highest flood risk (noting that at some locations roads, will need to cross high flood risk corridors). Where this is not possible, flood mitigation measures will need to be defined as part of ongoing scheme design.
	Potential sources of pollution to groundwater during operation are mainly related to leaks and spills due to maintenance activities. The operation activities will not have a direct impact on groundwater; the significance of the impact is assessed as negligible.	Reduction of wastes to the extent possible whilst maximizing the re-use of materials. Recycling opportunities will be investigated by the EPC Contractor. All waste and garbage will be collected, segregated and stored before disposal in at a location to be agreed with the Local Government respective officer or environmental officer. Establish a designated storage area with an impervious base and

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
		impermeable bund walls and protected from precipitation. Store all fuel, oil and chemical storage in the designated secure area. Check hoses and valves regularly for signs of wear and ensure that they are turned off and securely locked when not in use. Place diesel pumps and similar on drip trays to collect minor spillages. Check trays regularly and remove any accumulated oil. These elements will be included in the Operational EMP and Hazardous Materials & Waste Management Plan.
Soils & Geology	Soil erosion and loss of soil resource - Minor impacts expected. The sensitivity of the soil receptor is low and magnitude of change is medium during construction.	Clearly demarcate storage and staging areas and store all materials, equipment and vehicles in demarcated area to reduce soil damage. Furthermore, vehicles will be confined to demarcated roadways.
	Soil contamination - There is the potential for soils to be contaminated by chemical spills or oil leaks from machinery, as well as incorrect disposal of waste, including accidental discharge of sanitary or other wastewaters to the local environment. Impacts are considered to be of minor significance.	Establish native grasses where feasible in erosion control channels and in other areas immediately after final disturbance. Salvage and store topsoil and subsoil before areas are excavated, with topsoil stripped and stockpiled separately. Segregate excavated soils into stockpiles dependent on material type and provide erosion control while stockpiled. On completion of earthworks, backfill material in the same stratigraphic sequence. Placement and compaction of gravel where needed, excavation of a drainage ditch along uphill sides where appropriate, and placement of low berms on downhill sides where necessary. If narrowing access roads following construction, scarify compacted

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
		areas and establish native grasses, where possible given the conditions, in any soil-based channels that are constructed alongside the road. Once construction and road-building are complete, scarify all areas compacted by off-road vehicle / equipment movements and establish native grasses. Store all materials within designated areas of temporary storage facilities and provide supplies to clean-up of minor spills. The source of material for road construction is currently unknown, in case there will be the need to source it from a nearby quarry. Clay materials at site are not recommended to be used as road and construction fill. Confine all vehicles and equipment to the roadway and, to extent possible, minimize activities during wet conditions. When activities must occur in wet conditions, control storm water by using fabric, straw bales or other measures to impede storm water flow and prevent erosion. When damage to wet soil occurs, repair once dry conditions return. For storage of oil, establish a designated storage area, with impervious base and impermeable bund walls. Capacity must be sufficient to contain full volume within a bund and secured area. Store all fuel, oil and chemical storage in the designated storage area. Check hoses and valves regularly for signs of wear and ensure they are

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
		turned off and securely locked when not in use. Place diesel pumps and similar items on drip trays to collect minor spillages. Check trays regularly and remove any accumulated oil. Reduce the amount of waste to the maximum extent possible. Collect all solid waste and store until transported to the designated disposal site. These elements will be included in the Construction EMP, TTMP and Hazardous Materials & Waste Management Plan. The Hazardous Materials and Waste Management Plan will also include procedures for handling and storing redundant/broken PV panels on the Project site (for example, ensuing these are bunded or stored in a covered area of the site).
	Minor risks of earthquake or volcanic eruption during the duration of the Project life (10% chance within a 50 year period) which would result in impacts of major significance.	In relation to seismic hazards, both temporary and permanent buildings will comply with foreseeable climatic and seismic loads at the Project sites in accordance with National legislation / building standards. This will be considered at the detailed design stage on appointment of the EPC Contractor. Details will also be included in the Emergency Preparedness and Response Plan developed prior to construction in relation to actions to be taken and evacuation procedures in the event of an earthquake or volcanic eruption during the construction phase.

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
	During operation, the main impacts are related to vehicle traffic. If designated roads are kept to, impacts will be of minor significance.	Confine all vehicles to roadways. Monitor road condition regularly; then repair damaged and rutted roads rather than bypassing damaged sections. Monitor erosion controls and repair as needed. Where possible, maintain grass cover on berms and ditches. Prohibit use of vehicles and equipment off prepared roads. Re-stabilize existing eroded tracks and restore grass cover as needed. Do not collect firewood from the site. Reduce wastes to the extent possible and maximise re-use of materials with recycling opportunities investigated by the EPC Contractor. Collect, segregate and store all waste and garbage before disposal at the designated site. Clean up and store oily and chemical waste and contaminated material before transport to the designated disposal site to reduce risk of soil and groundwater contamination. Establish a designated storage area with an impervious base and impermeable bund walls and protected from precipitation. Capacity must be sufficient to contain full volume within a bund and secured area. Store all fuel, oil and chemical storage in the designated secure area. These elements will be included in the Operational EMP, TTMP and Hazardous Materials & Waste Management Plan.

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
Archaeology & Cultural Heritage	There is the potential for disturbance to local cultural heritage aspects and intangible assets (touristic values, herders or local farmers engaged in traditional livestock, funeral practices, living traditions & religious practices) and the magnitude of change is considered to be moderate. As such, the potential impact on cultural heritage assets is considered moderate during construction.	Chance finds procedure to be developed for the construction phase. All the Project Company and the contractors' personnel will be informed about the implementation of the Chance Finds Procedure and related trainings will be provided. Communications will be maintained with the Ministry of Culture, the Gobustan National Historical-Artistic Reserve together with the Institute of Archaeology and Ethnography of Azerbaijan National Academy of Sciences (ANAS) before and throughout construction phase. These will be scheduled and documented within the SEP. Detailed and regular information to local community members will be provided about Project activity to mitigate community concerns as a result of any misinformation and also inform them of specific construction activities which could affect cemetery users and farmers who utilize the access track. The EPC Contractor will plan construction activities to minimise the effects on local communities and farmers and to reduce impacts on the nearby cemeteries in case of rituals as so far as possible. This will be set out in the CEMP.
	During operation, it is institutional stakeholders' perception that visual impact of the Project may pose risk to the historical archaeological landscape of Gobustan region. However, the Project is considered a great opportunity for the country as a clean energy Project.	The Project Company will ensure that the availability/accessibility to cemeteries in particular during construction but also during operations. In case of any grievance regarding intangible cultural heritage, the grievance will be responded to appropriately in compliance with the grievance procedure.

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
	The Project is therefore considered to have a slight indirect impact on cultural setting thus not significant, since possible initial change are expected to be followed by rapid habituation which reduces the nuisance level.	
Archaeology & Cultural Heritage (Intangible assets) – Cumulative	The presence of additional facilities and increased traffic may impact visual character and sense of place into the existing rural landscape. Impacts of minor significance are anticipated.	The responsibility for their management is collective, requiring individual actions to eliminate or minimise individual development's contributions. Project specific on-site mitigations and monitoring programmes will be implemented in order to minimise potential impacts of the Project.
Archaeology & Cultural Heritage ("Qobustan Rock Art Cultural Landscape" World Heritage Site) – Cumulative	Increased potential for disturbance to local touristic values and historical archaeological landscape of Gobustan region. Potential for further O&G wells to be developed in the Block cannot be excluded. Maintenance activities at SOCAR pipeline are expected. However, it is unlikely that those activities will be developed in the same timeframe as construction of Solar PV. Impacts of minor significance are predicted.	
Noise	it is expected that the Project will generally meet national/IFC noise limits (daytime) set for residential area; however, ground preparation works have the potential to result in increased noise levels at 300 m distance with an exceedance 13.9 dB over the national limits (residential area). National limits are met at a distance of 800 m (39.5 dB(A)) from the sound source. It should be considered however that ground preparation works are considered to be short term, temporary and intermittent in nature.	Best practicable means followed to ensure quietest available and construction techniques will be used to limit noise as far as possible. Construction only undertaken during daylight hours. All machinery will be regularly maintained. TTMP to be in place to regulate traffic and machinery use. Project construction traffic routing through community areas outside the Project access road will be avoided. Project grievance mechanism developed under IFC PS 1, EBRD PR1

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
	The noise impact due to construction works at site on nearest sensitive receptors is considered to be of moderate significance. The potential for significant noise impacts to arise from the construction vehicles and Qobustan access road upgrade activities are considered to be Negligible.	and ADB Safeguard Policy will be implemented. This will be utilised to record, monitor and respond to / mitigate any noise related impacts raised by nearby farmers and ensure compliance with noise limits is achieved at NSRs. If accommodation is required on the Project site, it will be located away from noisy locations as so far as possible. Monitoring of noise levels at worker accommodation will be conducted if any construction activities take place at night or during resting hours.
	Considering that the nearest sensitive receptor is located at approximately 1 km in distance, it is considered that National and IFC daytime and night-time limits will be met at all NSRs. As such, the potential noise impact during operation is considered to be of Negligible significance.	Should additional mitigation be required during the operational phase, the following will be considered: • Installation of acoustic enclosures for equipment causing radiating noise (this would typically give 3 dB attenuation). • Installing acoustic barriers without gaps and with a continuous minimum surface density of 10 kg/m2 in order to minimize the transmission of sound through the barrier. Barriers should be located as close to the source or to the receptor location to be effective. • Periodical maintenance of plant components such as inverters, transformers and other equipment and vehicles used for transportation to and from the site will be carried out to ensure their good working conditions. Project grievance mechanism developed under IFC PS 1, EBRD PR 1 and ADB Safeguard Policy will be implemented. This will be utilised to record, monitor and respond to / mitigate any noise related impacts raised by nearby farmers and ensure compliance with noise limits is

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
		achieved at NSRs.
Transport and access	Effects on the road network – the overall impact is predicted to be Moderate with regards to Qobustan road and Negligible for the M2 Highway.	
	Road wear and tear – The existing roads in the vicinity of the Project site are not suitable for vehicles carrying construction and plant material, therefore, Qobustan access road will be subject to upgrading operations. Damage to road edges and general 'wear and tear' of the road due to the increase generated in HGVs movements cannot however be excluded. Impacts prior to mitigation are considered significant.	

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
	Road safety – prior to mitigation, the addition of vehicles to the roads is expected to result in a Minor increase in the risk of traffic accidents on both local access road and highway.	Construction TTMP to be developed. Vehicles only permitted to use designated routes with no off-road driving permitted. Speed limits adhered to for all construction traffic. Regular maintenance of vehicles and use of manufacturer-approved parts. Maintain / repair of access roads as required. Temporary site compound to have appropriate parking, HGV manoeuvring space and holding and unloading areas. Training program conducted before site activities commence for all drivers. Procedure for check of licences and permits for all drivers with suitable training conducted. Measures to control delivery / departure of all HGVs to reduce conflict with other road users. Consultation with affected communities to make aware of schedule prior to HGV movements. Construction times to avoid local peak times and routing arrangements, particularly for HGVs. Traffic movements in settlement areas to be limited to daytime only. All drivers will be made aware of sensitive receptors potentially identified en-route.

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
	Operation – The number of vehicles during operation is likely to be very low, with access required only for maintenance and servicing. The majority of these will be light vehicles and, at the worst case, an HGV trip may be required to transport a replacement transformer to site. The effects of traffic movements stemming from the operational phase are therefore considered Negligible.	Operational TTMP to be developed.
Socio-Economics	Land acquisition and economic displacement –There are seven farmers who use the land within the Project Area through informal agreement with one of the farmers. There is a total of 11 farmer Project affected Households present. It is expected that this will be a long-term impact given the land use restrictions required for the Project. The impact is direct because the local farms will no longer be able to access land inside the Project area during the Project life cycle. The initial change on daily life/routine is expected to be followed up with a rapid habituation reducing to below nuisance level. Considering a moderate magnitude of impact, the degree of impact (negative) significance is considered to be Moderate.	Appointment of Community Liaison Officer (CLO) to communicate with stakeholders and all herders using the Project site. On-going communications with land users in accordance with the Project's Stakeholder Engagement Plan (SEP). Farmers and herders who experience a loss of livelihood shall be compensated in accordance with EBRD and ADB policy requirements and they shall be eligible for livelihood restoration measures. Implementation of LRP. Establishment and implementation of community grievance mechanism. Reclamation of the land will be conducted to backfill and restore native vegetation (where appropriate).

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
	Employment opportunities and procurement of goods and services – The Project will have direct positive impacts on employment in the area. Local job creation will potentially also lead to indirect employment creation, especially in the service sectors within the district up to regional level. Also, local procurement of goods and service especially during construction is expected. During construction there is a risk that violations of labour rights take place within the supply chain. This could include the use of forced or child labour, the exploitation of workers through excessive working hours, poor working terms and conditions, the absence of written worker contracts, and the lack of a worker grievance mechanism that can be used to raise concerns with senior management. Given the receptors sensitivity, the impact (positive) significance during construction is expected to be Moderate. The significance of impact (positive) is considered Minor to Negligible during operation.	Development of local hiring measures detailed in the Labour and Working Conditions Management Plan. Communicate employment estimates, timeframes and skills requirements clearly to the stakeholders on a continuous basis. Prohibition of forced and harmful child labour for Project and its supply chain. Measures will be detailed in the Labour and Working Conditions Management Plan and Contractor and Supplier Management Plan. During engagement, some of the women in the households were keen to apply for temporary positions but would need assistance with application forms. There will be a commitment in place within the Labour and Working Conditions Management Plan to provide support for people applying for positions, especially women. Skills training to enable greater employment of local people. Prior to construction, women from affected farmer and herder households will be specifically encouraged to apply for a temporary employment positions and additional support shall be provided to encourage the application of females. Support includes use of a female Company representative to engage with local women to inform them that the workplace will be suitable for the presence of women and additional support measures will be in place. Workers' grievance mechanism established and implemented. The Company and their EPC Contractor to only work with approved

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
		suppliers. Enhancement Investigate local sourcing and procurement opportunities to promote sustainable small business development. Ensuring the procurement from local sources. This will be formalised through measures to be taken to identify local suppliers and prioritise procurement from such parties. This will be included in the Contractor and Supplier Management Plan. Work with local vocational training schools and active NGOs to develop curricula which will qualify local students to better meet the needs to the developing solar industry locally. This will be set out in the Community Development Plan.
	Social infrastructure and services – The negative impact of an increased workforce population creating pressure on existing social infrastructure will be most felt during the peak period of construction activities, although it is noted that the increase outside of people in the local area will be limited. The impact is short-term as construction works are expected to continue for a period of approximately 18 months. The impact significance is assessed as Moderate during construction. It is anticipated that the continual presence of limited number of workers during the operational phase of the Project will have a negligible effect on the demand for medical care and local services in the district. Thus, the impact during operation is considered Negligible.	Workers' Accommodation Management Plan to be developed prior to construction. Provision of a dedicated medical professional to be employed by the Project. Provide a mobile medical centre nearby the site for the provision of first aid in line with the IFC / EBRD Guidance Note on Worker's Accommodation Standards. Implement measures to ensure access to local cemeteries around the Project site is not adversely affected by the fencing of the Project area. Such measures may include providing alternative routes, which can be accessed by pedestrians as well as vehicles. Enhancement

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
	Infrastructure – The Project will involve the upgrade of existing access road in the area. Also, the Project will add 230 MW generating capacity to Azerbaijan existing renewable energy capacity. Impact is positive because the operation of the Project will be contributing towards the ongoing development of the country in terms of potential for renewable energy development and economic diversification.	Investing in local social infrastructure, including health care facilities, to meet the needs of the community in partnership with local government and in accordance with community demands as established from public consultation activities without seeking to supplant or replace the role of the government in providing social services.
	Community health & safety & security – Impacts relating to increased traffic is discussed above under traffic and transport. Risks to community health from construction activities such as accidents, chemical releases or such are low provided the community or their livestock do not trespass within the construction area.	Community health and safety measures developed for construction within relevant management plans (including TTMP, Security and Human Rights Management Plan, elements of the OHSP and EPRP) and updated for operational phase. Development and implementation of EPRP. Communicate Project risk to local communities and address concerns accordingly. Monitor any complaints filed via grievance redress mechanism.
	Air pollution – Unmitigated respiratory effects from dust generated by construction activities would be direct, negative impacts that are localized but short to medium term. With mitigation these effects would become localized and Minor. No impact is expected during operation.	Implement and comply with the TTMP. Traffic safety training for all drivers as part of their induction and on an ongoing basis. Caution signs set up in the vicinity of entrance points from the M2 highway to Qobustan road up to the Project site. Flagmen available at the entry-exit points of the Project site.

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
	Spread of food & water-borne diseases – It is possible that Project activities generating waste, if not carefully managed, could result in contamination of groundwater or surface water. Poor waste management practices also could affect livestock health in the area adjoining the Project site. The impact (negative) significance is assessed to be Moderate during construction, while Negligible during operation.	Implementation of Hazardous Materials and Waste Management Plan Effluent will be stored in a septic tank or untreated storage tank with secure secondary containment and removed and disposed of periodically by a licenced contractor. Ensure all required licenses / permits are in place where third party wastewater/waste disposal & transport companies are to be utilized and that they facilities are audited to ensure that they are fit for purpose. Ensure there is proper and adequate sanitation facilities at the site during construction.
	Introduction and spread of communicable diseases – Project will cause local employment that will attract direct and indirect opportunities and other potential worker migration. The rapid increase in population from the presence of large, male workforce may increase the risk of introducing and spreading communicable diseases. The introduction and spread of communicable disease is an indirect negative impact, which will be local and short to medium term. The impact (negative) significance is assessed to be Moderate during construction, while Negligible during operation.	Develop and implement Project-specific Covid-19 management measures for the Project site and workers' accommodation area. Ensure health screening is being conducted for employees and contractors before contracting workers and on a periodic basis throughout their employment/contract. As part of health and safety induction for workers, provide awareness training on communicable disease prevention. Provide this training on an ongoing basis. Identify opportunities to support local public health campaigns that focus on prevention of communicable diseases.

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
	Security – There is the potential for security personnel to use excessive force that results in intimidation or even physical damage, acting as a trigger event to further potential conflicts and Human Rights (HR) risks. The impact is largely reversible with the proper HR training. Conflicts between workers of different nationalities or different employers may also occur, including any harassment of females, workers from different ethnic groups, or on other grounds should not be excluded. The potential impact during construction is considered to be Moderate adverse, pre-mitigation.	A Code of Conduct will be compiled to govern the behaviour of Project personnel. Project Workers will be provided with training on Code of Conduct detailed in the Labour and Working Conditions Management Plan and Security and Human Rights Plan and internal HR policies as well as potential interactions, conflicts, the community's sensitivities, culture, local traditions, communication and behaviours to prevent any potential conflicts. Ensure that all potentially affected stakeholders know how to contact the company and to file grievances or concerns about security arrangements. The grievance mechanism will be monitored for any grievances raised relating to the conduct of workers, conflict and harassment. Any such grievances will be documented, investigated, and addressed in coordination with relevant stakeholders.
Social receptors (herders using the area for grazing) - Cumulative	The presence of additional facilities may increase the potential for pressure on the availability of alternative land for herders leading to impacts of moderate significance.	The responsibility for their management is collective, requiring individual actions to eliminate or minimise individual development's contributions. Project specific on-site mitigations and monitoring programmes will be implemented in order to minimise potential impacts of the Project. Community engagement activities will be carried out to ensure that local communities and farmers / herders are aware of potential H&S risks and construction activities (including scheduling) associated with both the Project and the OHL.

Environmental Receptor	Predicted Impact	Mitigation / Enhancement
Climate change	It is possible that the Project will be subject to increasing air temperatures and frequency of extreme weather events in the longer-term as has been the pattern over the last 10 years in Azerbaijan. This could include severe wind events and large hail amongst others. The rise in air temperatures presents a medium magnitude of change with low to medium sensitivity of the area, resulting in impacts of minor significance. Increases in heavy rainfall events and high winds may damage Project infrastructure thereby causing a high magnitude of change and moderate to major impacts prior to mitigation.	Insurance to cover extreme weather events. Advanced technologies to provide for dry cleaning methods during operation. Water conservation measures to be investigation and implemented as applicable during construction. This may, for example, include use of grey water where appropriate for dust dampening.
GHG emissions	The project will result in reduction of around 796,6371,155,125 t CO_2 eq per year thereby leading to beneficial impacts.	None.

16 Environmental and Social Management and Monitoring

16.1 Introduction

This Environmental and Social Management and Monitoring chapter summarises the monitoring proposed within this ESIA (mitigation is set out in Chapter 15, Table 15-1). The Environmental and Social Management and Monitoring Plan (ESMMP) (provided as a separate document) sets out mitigation and monitoring measures required along with corresponding sub-plans required for the Project and implemented by the EPC contractor. The ESMMP will be transposed into the Construction Environmental and Social Management Plan (ESMP) and Operational ESMP respectively.

The mitigation, monitoring and performance improvement measures will be incorporated into the Project Environmental and Social Management System (ESMS) developed by the Company. The measures and actions to address identified impacts and risks will favour the avoidance and prevention of impacts over minimisation, mitigation or compensation wherever technically and financially feasible. Where risks and impacts cannot be avoided or prevented, mitigation measures and actions are identified so that the Project can operate in compliance with applicable laws and regulations in addition to meeting international standards, namely IFC PSs 1 to 8, EBRD PRs 1 to 10 and ADB Safeguard Policy. Mitigation and enhancement measures are set out in Chapter 15 of this ESIA.

16.2 ESMS and Sub-Plans

The scope of the ESMS for the Project will include:

- The operational standards to be applied to the Project, referred to as the "Applicable Standards".
- The Company's policy for environmental management, occupational health and safety, labour and community health, safety and security.
- Organisational chart for environmental, social, health and safety (ESHS) elements, roles and responsibilities and Contractor management.
- ESHS reporting – both of routine and incidents / accidents.
- Audit, review and management of non-conformances.
- Community grievance mechanism (see also the SEP).
- Workers' grievance mechanism.

A number of management plans (sub-plans) will be produced in support of the ESMS and ESMMP. Management plans consist of a combination of operational policies, procedures and practises. These plans will provide a system against which to monitor and audit environmental and social performance. In addition, they will detail the practical methods required to ensure work is completed in accordance with current best practice, the mitigation measures in the ESIA and legislative and regulatory requirements. The Project Company is responsible for delegation of implementation of these plans.

The construction management plans are detailed in the table below. As shown in the table, a number of management measures such as those relating to COVID-19 and community health and safety are incorporated into several documents to provide focus and reduce the volume of plans in place during construction. The plans will be expanded upon from this outline prior to the construction phase of the Project.

Table 16-1: List of Construction Management Plans and Overview of Contents

Management Plan	Overview of Elements for Implementation	Implementation Lead
ESMS Manual	Environmental and social policy. Organisational structure. Environmental management system documentation. Training procedures. Toolbox talk procedures and schedule. Legal, permit, training, management review, deviation and incident registers. Induction and training forms and attendance sheets. Daily walkover procedures and weekly checklists. Internal audit and internal reporting and management review procedures. Non-conformance report form.	EPC Contractor
Site Mobilisation Plan	Site mobilisation procedures. Induction training. Environmental training and awareness. Timetable for excavation and clearing works. Mobilisation and delivery of machinery and equipment. Set up of containerized offices and welfare facilities. Worker transportation management and procedures for mobilisation.	EPC Contractor

Management Plan	Overview of Elements for Implementation	Implementation Lead
Construction Environmental Management Plan	Environmental policy and objectives, Dust management and monitoring procedures. Noise management and monitoring (as required) procedures. Biodiversity management and monitoring. Landscape management / enhancement measures. Spoil disposal procedures. Pollution prevention and control procedures. Pollution incident register. Resource use register. Pest control register. Monitoring register. Performance monitoring procedures including corrective actions procedure. Environmental reporting. Performance review.	EPC Contractor
Labour and Working Conditions Management Plan	HR Policy. Worker Code of Conduct. Anti-corruption and Bribery Policy. Influx management procedures. Recruitment, worker payment and worker welfare procedures. Working hours and payment register. Worker welfare register. Welfare map. Sanitary facility cleaning form. Worker grievance procedure and register. Disciplinary procedure and actions register. COVID-19 management procedures. Communicable diseases management procedures.	EPC Contractor

Management Plan	Overview of Elements for Implementation	Implementation Lead
Worker Accommodation Management Plan	Accommodation Inspection and approval procedure. Accommodation register. Worker transport procedure Worker transport register Worker accommodation checklist. Influx management procedures. COVID-19 management procedures and register. Communicable diseases management procedures and register.	EPC Contractor
Stakeholder Engagement Plan	Stakeholder engagement register and commitments. Grievance procedure and register.	The Company.
Livelihood Restoration Plan	PAP register LRP Action tracker. Audit and close out audit procedures.	The Company.
Community Development Plan	Community development procedures. Procedures for addressing needs of women and vulnerable groups. Roles and responsibilities. Monitoring and reporting procedures	The Company.
Gender Management Plan	Gender policy. Gender actions.	EPC Contractor (on-site) The Company (off-site)
Contractor and Supplier Management Plan	Contractor E&S staff recruitment procedure. Contractor and supplier screening procedures. Supplier screening and monitoring procedures. Contractor and supplier register.	EPC Contractor.

Management Plan	Overview of Elements for Implementation	Implementation Lead
Hazardous Materials & Waste Management Plan	Wastewater management. Resource use management and register. Hazardous storage. Hazardous and non-hazardous wastes. Hazardous materials entry and storage procedures. Hazardous materials register. Refuelling procedure. Waste management and evacuation procedure. Final waste disposal facility inspection procedure and register. Waste contractor register. Waste log / transfer notes. Chain of Custody Form. Environmental aspects map.	EPC Contractor.
Traffic and Transportation Management Plan.	Community health and safety procedures. Driver's Code of Conduct. Drivers register and training procedures. Vehicle inspection procedure. Vehicle register. Haulage company procedure. Haulage truck and trip time register. Route maps for transportation of panels and materials.	EPC Contractor.
Security and Human Rights Management Plan	Security Policy. Code of Conduct. Security training procedures and register. Site access procedure and register. Security incident management procedure and register. Community health and safety measures. Influx management procedures.	EPC Contractor.

Management Plan	Overview of Elements for Implementation	Implementation Lead
Occupational Health and Safety Plan	Risk assessment procedure and form. Job safety analysis procedure and form. Permit to work procedure and register. COVID-19 management procedures and register. Communicable diseases management procedures and register.	EPC Contractor.
Emergency Preparedness and Response Plan	Emergency response procedure (per risk). Emergency equipment register. Emergency response training and register. Drill register. Community notification and warning procedures. Emergency equipment map and nearby hospitals / medical facilities map.	EPC Contractor.
Chance Finds Procedure	Chance Find Procedure. Chance Find Register.	EPC Contractor.

A variety of operational management plans shall be prepared, in advance of the start of operations and these documents shall take into consideration any lessons learned gained from the construction stage of the Project.

16.3 Environmental and Social Monitoring

A programme of Environmental and Social Monitoring will be undertaken in order to verify the effectiveness of the proposed mitigation measures (identified in Chapter 15) in reducing impacts and also to allow mitigation measures to be refined or developed as needed to further address potential impacts or to develop plans for future development. More specifically, the objectives of the monitoring program are to:

- Record Project impacts during construction and operation.
- Meet legal and community obligations.
- Evaluate the effectiveness of the mitigation measures and identify any shortcomings.

- Allow refinement and enhancement of mitigation measures to further reduce impacts.
- Allow identification unforeseen issues or changes in operations and provide information for development of mitigation measures to deal with those issues or changes.

The environmental and social monitoring program was developed in accordance with the best international practices for the solar PV sector.

The monitoring will be comprised of weekly inspections, internal monthly audits and quarterly external audits during construction and monthly semi-annual / annual audits during operation (frequencies will be determined but are likely to be more frequent earlier in the operational phase moving to annual audits after the first year). Table 16-3 details the proposed monitoring programme.

Environmental and social targets set by the Company will be assessed by the following key performance indicators (Table 16-2) which were set according to the national standards and international best practice for the Project during construction, operation and decommissioning phases as appropriate. Requirements listed in the tables below should be read in conjunction with the outcomes and provisions of the Project plans to be developed as listed under Section 16.3.

Table 16-2: Key Performance Indicators

Environmental / Social Component	Project Activities	Key Performance Indicators	Project Phase	Best Practice Guidelines
Dust	Earthwork and removal of vegetation cover. Transportation of materials, equipment, and employee commuting. Storage of chemicals, materials, and waste on site. On-site energy and heat consumption. Other indirect supply chain activities.	Fugitive dust and particles levels (SPM, PM10)	Pre-construction Construction Decommissioning	International best practice (IFC EHS General Guidelines) on management of emissions to air. Azerbaijan air quality standards.
Ambient noise and vibration level	Earthwork and site preparation. Transportation of materials, equipment, and employee commuting. On-site workers' accommodation.	Sound levels in Leq dBA for daytime and night-time. Number of noise complaints received.	Construction Operation Decommissioning	IFCs general guidelines (operational fixed night-time limit of 45dBA, daytime limit of 55 dBA). Azerbaijan noise standards (daytime limit of 40dBA and night-time limit of 30dBA for residential areas).

Environmental / Social Component	Project Activities	Key Performance Indicators	Project Phase	Best Practice Guidelines
Surface water and Groundwater quality / pollution prevention.	Storage of oil, lubricating materials, chemicals, domestic and industrial waste on site. Transportation of oil, lubricating materials, chemicals, and other computations. Earthworks.	Water contaminants identified in the international standards (WHO/IFC). Quantity of wastewater generated and properly disposed by a licensed waste contractor. Number of incidents requiring clean-up operations – spill kits. Integrity periodical checking recordings for septic tank and hazardous materials storage areas. Number of regular checks and maintenance of construction machinery and vehicles. Number of regular visual checks to ensure waste segregation and disposal practices are in line with the Hazardous Substances and Waste Management Plan.	Construction Operation Decommissioning	International best practice (IFC EHS General Guidelines) on protecting surface and groundwater, management of hazardous materials and management of waste. National standards

Environmental / Social Component	Project Activities	Key Performance Indicators	Project Phase	Best Practice Guidelines
Soil quality and erosion	Storage of oil, lubricating materials, chemicals, domestic and industrial waste on site. Transportation of oil, lubricating materials, chemicals, and other computations. Earthwork.	Erosion rate observation. Soil contaminant levels identified in the international standards. Number of incidents requiring clean-up operations – spill kits. Reporting of regular checks and maintenance of construction machinery and vehicles. Waste segregation and disposal practices are in line with the Hazardous Materials and Waste Management Plan.	Construction Operation Decommissioning	International best practice (IFC EHS General Guidelines) on restoring degraded land and re-establishing vegetation relevant to construction, operation, and decommission.
Flora protection	Earthwork. Workers onsite. Storage of oil, lubricating materials, chemicals, domestic and industrial waste on site. Transportation. Physical presence of solar panels.	Destruction rate observation. Invasive species numbers / species composition changes observations. Number of environmental toolbox talks for workers.	Construction Operation Decommissioning	International best practice (IFC EHS General Guidelines, IFC PS6/ EBRD PR6 / ADB Safeguard Policy) on restoring degraded land and re-establishing grassland vegetation relevant to construction, operation, and decommission.

Environmental / Social Component	Project Activities	Key Performance Indicators	Project Phase	Best Practice Guidelines
Fauna protection.	Earthworks. Storage of oil, lubricating materials, chemicals, domestic and industrial waste on site. Transportation.	Occurrence and fatalities Environmental toolbox talks for workers.	Construction. Operation. Decommissioning.	International best practise (IFC PS6/ EBRD PR6 / ADB Safeguard Policy).
Avifauna protection.	Earthworks. Physical presence of solar panels.	Occurrence and fatalities (collision into PV panels) Number of environmental toolbox talks for workers.	Construction. Operation.	Best international standards and practices for bird surveys and monitoring. International best practise (IFC PS6/EBRD PR6 / ADB Safeguard Policy).
Archaeology / cultural heritage.	Earthworks. Transportation. Workers onsite.	Chance finds. Number of grievances recorded. Number of meetings held with relevant authorities.	Construction. Decommissioning.	International best practise (IFC EHS General Guidelines, ADB Safeguard Policy and PS8/ EBRD PR8).
Occupational H&S	Earthwork and site preparation. Site construction activities, use of construction equipment.	Fugitive dust and particles levels (SPM, PM10)	Construction Decommissioning	International best practice (IFC EHS General Guidelines) on minimising occupational hazards and the use of appropriate PPE.

Environmental / Social Component	Project Activities	Key Performance Indicators	Project Phase	Best Practice Guidelines
Waste management	Generation of general waste on site. Use of oil, lubricating materials and other chemicals on site.	Inspection reports. Waste inventory.	Construction Operation Decommissioning	International best practice (IFC EHS General Guidelines) on waste management.
Socio –economic conditions	Land acquisition and economic displacement Employment opportunities and procurement of goods and services Pressure of Social infrastructure and services	Number of local workers hired. Number of training sessions performed Monthly workforce statistics Number of grievances recorded Number of stakeholder engagement activities carried out in accordance with the SEP.	Pre-Construction / Construction Operation Decommissioning	International best practise (IFC PS1, PS2, PS5, ILO, EBRD PRs, ADB Safeguard Policy) IFC/ EBRD Guide for Workers Accommodation.
Traffic management	Pressure on the local road network /_Addition of vehicles (even HGVs) to the roads	Number of road safety briefings provided to the workforce. Number of road safety complaints received. Number of driving incidents including speed violations. Number of accidents / fatalities.	Construction Operation. Decommissioning	International best practice (IFC EHS General Guidelines)

Environmental / Social Component	Project Activities	Key Performance Indicators	Project Phase	Best Practice Guidelines
Community H&S and security	Additional traffic and increased risk of traffic-related accidents and injuries Fugitive dust Potential contamination of groundwater or surface water Potential spread of Communicable Diseases due to workers influx Project's site security measures	Number of Emergency Drills. Number of grievances received. Number of employee health screenings Number of health-related awareness and training to workforce Number of vehicle inspection checks carried out in accordance with the TMP.	Construction Operation Decommissioning	IFC/ EBRD Guide for Workers Accommodation. Adherence to International food standards International best practise (IFC PS1, PS4)

Table 16-3: Project Monitoring Programme

Component	Project phase	Parameters	Responsibility	Deliverables	Frequency	Location	Standard
Dust	Pre-construction	Dust levels (SPM, PM10)	EPC Contractor	1 sample per location	Once	Along the roadways Construction areas Worker camp Closest residential receptor.	Azerbaijan air quality standards. Best international practice.
	Construction				Quarterly during construction season		
	Operations		O&M Contractor.		Once per year		
Ambient noise quality	Construction / Decommissioning	dBA level	EPC Contractor	Records of each location	Quarterly during construction Following any complaint	At nearest identified receptors locations	Best international standard (IFC General EHS Guidelines Limit)
	Operation		O&M Contractor.	Records of each location	Start of operations Following any complaint		IFC noise level guidelines for residential area: night -time limit of 45dBA, daytime limit of 55 dBA Azerbaijan noise standards:

Component	Project phase	Parameters	Responsibility	Deliverables	Frequency	Location	Standard
							daytime limit of 40dBA and night-time limit of 30dBA for residential areas
Surface and groundwater quality	Pre-construction	Water contaminants identified in the international standards (WHO/IFC).	EPC Contractor	Site Inspection Reports	Once	Carried out as and when identified. Water quality samples at ephemeral seasonal watercourses are to be taken if there are signs of pollution in case of accidental spills	International best practice (IFC EHS General Guidelines) on protecting surface and groundwater, management of hazardous materials and management of waste.
	Construction / Decommissioning			Weekly site Inspection Reports Sampling if required annually and in case of spill	Visual check during weekly inspections After any accidental spill, laboratory analysis required.		
	Operation		O&M Contractor.	Site Inspection Reports Sampling if required in case of spill	During planned site inspections and maintenance activities		
Soil quality and erosion	Pre-construction	Erosion rate observation	O&M Contractor.	Photographic records / Site Inspection Reports	Once	General at site	International best practices.

Component	Project phase	Parameters	Responsibility	Deliverables	Frequency	Location	Standard
	Construction/ Decommissioning	Soil contaminants identified in international standards.	EPC Contractor	Records at each location Checklist observation reports/ Weekly Site Inspection Reports Annual photographic record	Visual inspections continuously during construction After any accidental spill, laboratory analysis is required.	All areas destructed by earthwork, construction equipment, and workers. All roadways. All areas of accidental spills	Soil Quality Standards.
	Operation		O&M Contractor.	Annual photographic record Checklist observation record/ Site Inspection Reports	During planned site inspections and maintenance activities After major spills, precipitation/run-off event		
Flora protection	Pre-construction	Disturbance levels, erosion.	The Company.		Once	Soil monitoring locations	

Component	Project phase	Parameters	Responsibility	Deliverables	Frequency	Location	Standard
	Construction/ Decommissioning		The Company.	Pre-construction survey to confirm no sensitive species present. Photographic and narrative record Site Inspection reports	During construction and after construction season (reclamation). Prior to decommissioning.	Soil monitoring locations	Best international standards
	Operation		The Company.		Annually	Soil monitoring locations	
Fauna/Avifauna protection	Pre-construction	Sighting/nests	The Company.	Record sightings	Once.	Project site	Best International Standards - IFC PS6/ EBRD PR6
	Construction / Decommissioning	Animals trapped in the excavations. Animal carcass / fatalities.		Photographic and narrative record Site Inspection reports	Visual inspections are continuous during construction	All areas destructed by earthwork, construction equipment, and workers.	Best International Standards - IFC PS6/ EBRD PR6.
	Operation	Bird fatalities.			Each season (breeding, migration etc).	Project Site	Best International Standards - IFC PS6/ EBRD PR6.

Component	Project phase	Parameters	Responsibility	Deliverables	Frequency	Location	Standard
					During planned site inspections and maintenance activities		
Archaeology / Cultural heritage	Construction	Chance finds. Community grievances.	EPC Contractor	Chance find recording. Grievance log.	Continuous during construction	All areas disturbed by earthwork, construction equipment and workers.	Best international practises (IFC EHS General Guidelines and PS8/ EBRD PR8).
	Construction / Decommissioning	Noise, fire safety, hazardous materials registrar, solid and sanitary waste COVID-19 protection measures use. Traffic safety, signs, road inspection / Record of accidents and near misses	EPC Contractor.	Incident reporting. Site Inspection Reports	Daily	At construction camp. Construction compound. Substation building. All roadways	Best international practices (IFC PS4 and general EHS guideline). International COVID-19 guidelines. IFC / EBRD, Workers' Accommodation: Processes and Standards (2009).

Component	Project phase	Parameters	Responsibility	Deliverables	Frequency	Location	Standard
		Health incident registration Community and workers grievances Workers H&S trainings Workers Health checks Workers Accommodation and welfare checks.					
Occupational and public health and safety	Operation	Noise, fire safety, hazardous materials registrar, solid and sanitary waste COVID-19 protection measures use.	O&M Contractor.	Incident reporting. Site Inspection Reports	Daily	At construction camp. Construction compound. Substation building. All roadways Project affected communities.	Best international practices (IFC PS4 and general EHS guideline). International COVID-19 guidelines.
	Pre-construction		The Company.	LRP	Once		

Component	Project phase	Parameters	Responsibility	Deliverables	Frequency	Location	Standard
		Traffic safety, signs, road inspection / Record of accidents and near misses Health incident registration Community and workers grievances Workers H&S trainings Workers Health checks Workers Accommodation and welfare checks. Community grievances				Construction area accommodation.	IFC / EBRD, Workers' Accommodation: Processes and Standards (2009). International best practise (IFC PS1, PS2, PS5, ILO, EBRD PRs) IFC/ EBRD Guide for Workers Accommodation.
Socio –economic conditions	Construction/ Decommissioning	Livelihood restoration Community Grievances	The Company.EPC Contractor.	Site Inspection reports	Continuous	Project affected communities.	

Component	Project phase	Parameters	Responsibility	Deliverables	Frequency	Location	Standard
		Social and employment records (wage rate, unemployment rate, local government annual budget, contracts with local service) Trainings for local hiring provided and completed. Confirmation of employment of professionals at construction camps (i.e. healthcare) Workers accommodation and welfare checks. Workers grievances.		Quarterly summary report (according to LRP requirements as well)		Construction area accommodation. Construction areas	International best practise (IFC PS1, PS2, PS5, ILO, EBRD PRs) IFC/ EBRD Guide for Workers Accommodation. Best international practices.

Component	Project phase	Parameters	Responsibility	Deliverables	Frequency	Location	Standard
	Operation	Livelihood restoration Community Grievances Social and employment records (wage rate, unemployment rate, local government annual budget, contracts with local service) Trainings for local hiring provided and completed. Confirmation of employment of professionals at construction camps (i.e. healthcare)	The Company.	Annual summary report (according to LRP requirements as well)	Continuous		
	Construction/ Decommissioning		EPC Contractor.	Inspection and security reports	Continuous		

Component	Project phase	Parameters	Responsibility	Deliverables	Frequency	Location	Standard
		Workers accommodation and welfare checks. Workers grievances. Number of security personnel employed. Number of inspection missions. Community Grievances regarding security personnel.					
Security	Construction/ Decommissioning	Number of security personnel employed. Number of inspection missions.	EPC Contractor.	Inspection and security reports	Continuous	Construction areas	Best international practices.

Component	Project phase	Parameters	Responsibility	Deliverables	Frequency	Location	Standard
		Community Grievances regarding security personnel.					

16.4 Commitments Register

Masdar will evaluate environmental and social aspects for the Proposed Project, as reported in this ESIA Report, and as a result will prepare a Commitments Register. For construction, this is set out in the separate ESMMP table. The register lists mitigation and monitoring measures required to manage the significant environmental and social impacts identified in the ESIA Report. The Commitments Register provides a focus for the Developer ESMS and EPC / O&M Contractor CEMP and OEMP.

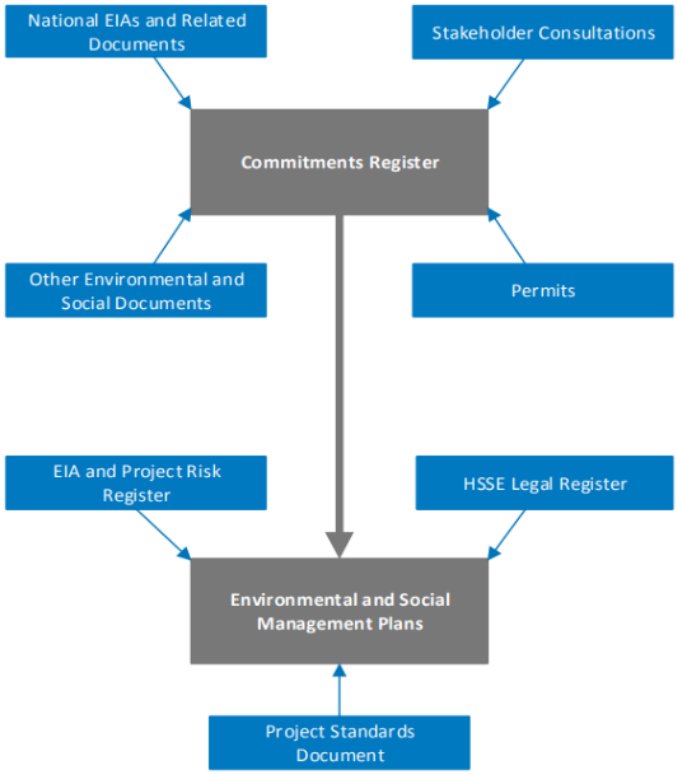

Figure 16-1: ESMMP Development Flow Diagram[97]

Changes and additional sources of commitments (e.g. permit conditions) will be incorporated to the Commitments Register throughout the Proposed Project lifecycle. It indicates how management, mitigation and monitoring measures from the ESIA will be actively implemented on the ground by the EPC Contractor and sub-contractors.

[97] https://esa.afdb.org/sites/default/files/20%20UK11-24483_6_NBIA%20ESIA%20ESM_Chapter%2020.pdf

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- www.iucnredlist.org

Appendix A AERA OHL Letter

MINISTRY OF ENERGY OF THE REPUBLIC OF AZERBAIJAN

ENERGY REGULATORY AGENCY

Azerbaijan Republic, Baku city, AZ1029
H.Aliyev ave. 152, Chinar Plaza

e-mail: office@regulator.gov.az
tel: (+99412) 598 16 53/54; / fax: (+99412) 566 09 40

30 " 08 2021 № AERA-01-06-504/21

Mr.Abdulla Zayed
Head, Development & Investment (Central Asia & Russia),
Abu Dhabi Future Energy Company PJSC – Masdar

Subject: Overhead Tranmission Lines: Area 60 Solar PV Project

Dear Mr.Abdulla,

I hope this letter finds you and Masdar team well.

I refer to the Project Documents signed between the Ministry of Energy of the Republic of Azerbaijan, Azerenerji and Abu Dhabi Future Energy Company PJSC - Masdar (**"Masdar"**) dated 7th April 2021. We would like to reiterate the importance of the continued collaboration between Masdar and the main stakeholders in the Republic of Azerbaijan to support the development activities related to the 230MWac solar project at Area 60 (the **"Project"**).

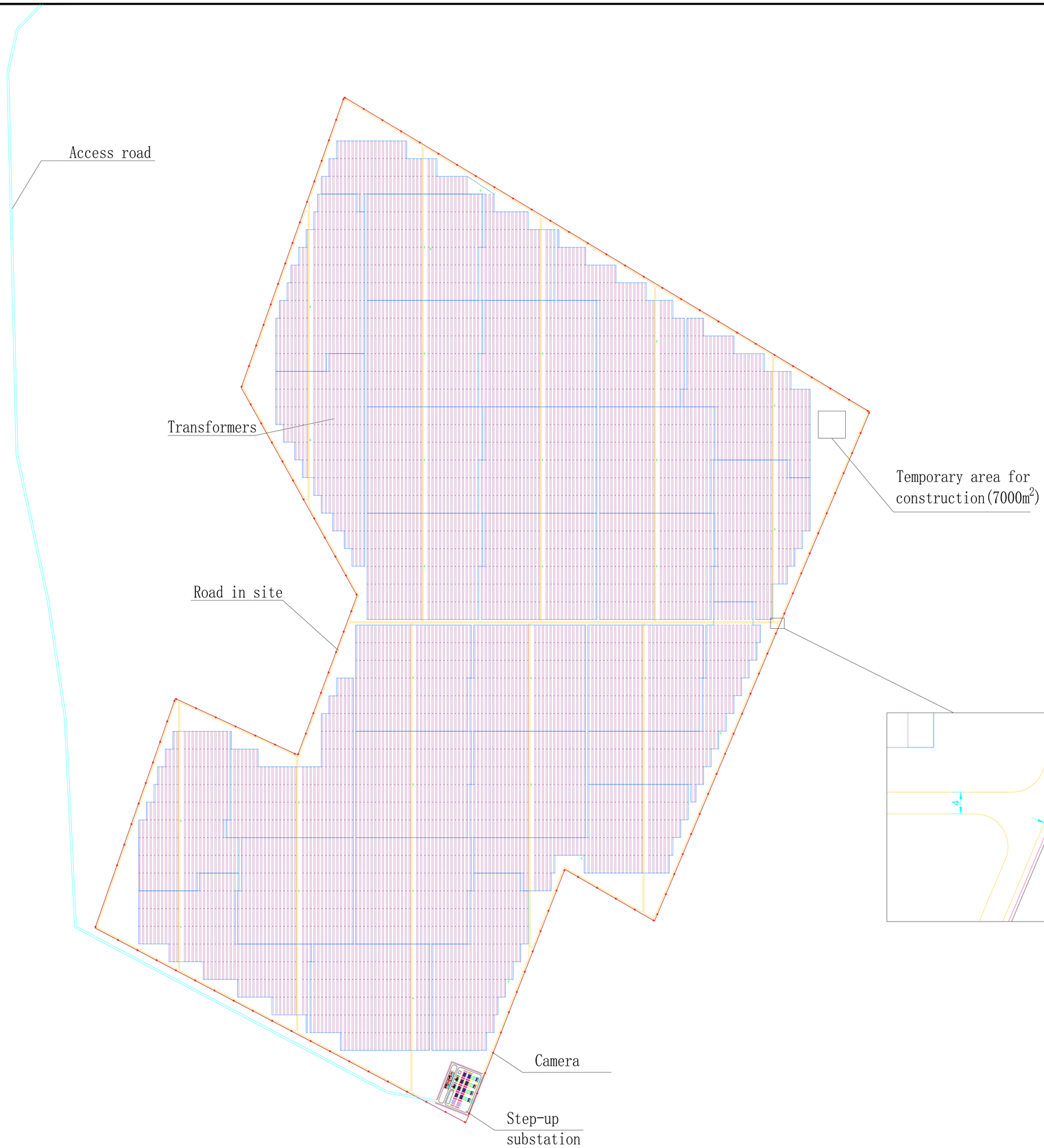
In relation to the single-circuit 330 kV overhead transmission line, 55 km long (the **"OHL"**), we hereby confirm that the OHL is not being built solely for the purposes of Project. The OHL will serve a number of other projects and plants in future.

The Government of the Republic of Azerbaijan (**"GOA"**) has already established Alat Trade Zone next to the area of the Project (located in the Alat region), and electricity demand is expected to increase significantly in future in that area from a mixture of public and private sector enterprises.

Yours sincerely,

Rovshan Ismayilov
Deputy Chairman of the Board,
Acting Chairman

Appendix B Proposed Project Layout



SITE SUMMARY:

SITE BOUNDARY AREA= 5495340m²
FENCE AREA=5489726m²
FENCE PERIMETER=11225m

SYSTEM SPECIFICATION
DC CAPACITY=310.99MW
AC CAPACITY=266.84MW

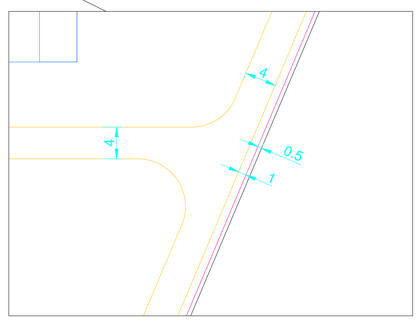
EQUIPMENT QUANTITIES
5142 TOTAL TRACKERS
575904 TOTAL MODULES
20568 TOTAL STRINGS

29 MV STATIONS
20 POWER BLOCKS WITH 177 TRACKERS EACH
9 POWER BLOCKS WITH 178 TRACKERS

PV MODULE SPECIFICATIONS:
LR5-72HBD 520-545M
RATED POWER=540W
OPEN CIRCUIT VOLTAGE=49.50V
MODULE EFFICIENCY=21.1%
DIMENSIONS: 2256×1133×35mm

INVERTER SPECIFICATION
HUAWEI SUN2000-200KTL
MAX PV INPUT VOLTAGE=1500V
AC OUTPUT POWER=209.12kVA@38.2° C
44 INVERTERS PER STATION

MOUNTING SYSTEM SPECIFICATION
BIFACIAL SINGLE AXIS TRACKER
4 STRINGS PER TRACKER
28 MODULES PER STRING
TRACKING ANGLE RANGE: ±60°
Azimuth=0°
PITCH=14 m



LEGEND

- PV Trackers
- Road in site
- Access road
- MV Transformer
- Fence
- Camera

DEC 东方电气 DONGFANG ELECTRIC

APPROVED		Area 60 Solar Power PROJECT	Bidding STAGE
VERIFIED			General layoutSECTION
EXAMINED		General Layout of PV Plant	
CHECKED			
DESIGNED			
DRAWN			
CERTIFICATED	MOHURD, PRC	SCALE	DATE 2021.10
D.C.No.		DRAWING No.	

Appendix C Key Features along the OHL Route

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
BL - 12	356944.24	4424914.31	Livestock farm outside the OHL route	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
Between points RL-1 and RV-3	-	-	OHL intersecting the 330 kV "Alyat SPP – Janub PP" OHL route	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RL-1	356924.33	4423989.15	Baku-Gazakh-Georgia railway	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
GA-new-1	-	-	Green zone between Baku-Gazakh-Georgia railway and Baku-Gazakh-Astara-Georgia highway (right side of the road). The height of the trees does not exceed 3-4 m. The greenery consists mainly of pine, fir-tree, hornbeam, acacia, etc.	 

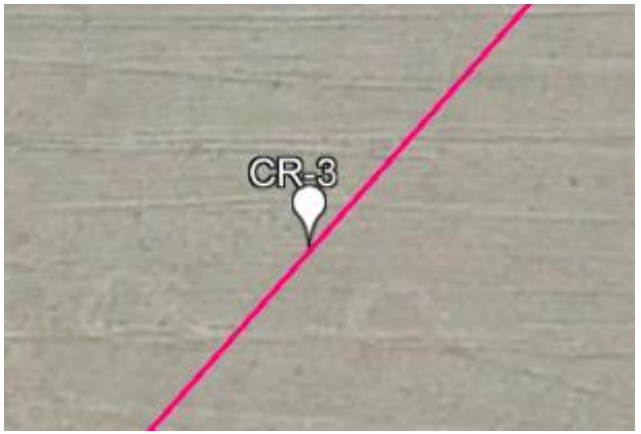
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
CR-1	356824.55	4423851.13	At this point, indicated as CR-1 in the KMZ file, there is a green area located on the right side of the road between the Baku-Gazakh-Georgia railway and the Baku-Gazakh-Astara-Georgia highway.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RL-1	356695.16	4423649.98	Baku-Gazakh-Astara-Georgia highway	
				

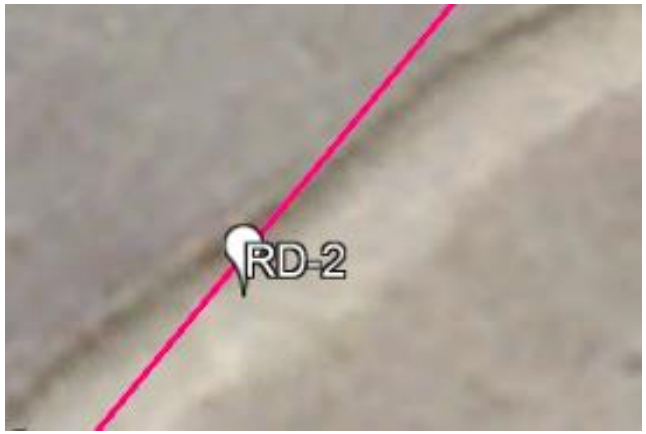
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
GA-new-2	-	-	At this point, indicated as CR-2 in the KMZ file, there is a green area is located on the left side of the road between the Baku-Gazakh-Georgia railway and the Baku-Gazakh-Astara-Georgia highway. The height of the trees is 5-6 m and more.	
				

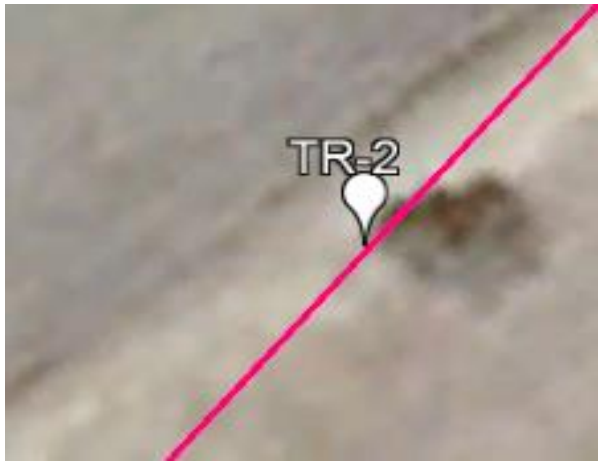
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
FW-1	356477.19	4423341.28	In this area, the future route of the 330 kV Alyat SPP - Janub PP TL intersects with two plastic water lines, one gas line and two OHLs of different voltages.	 

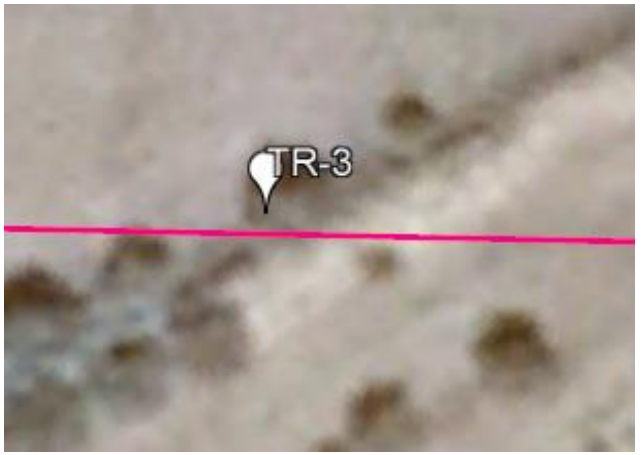
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
FW-2	356452.60	4423304.31	This point is close to point FW-1, through which water line a large diameter passes. A swamp was formed as a result of leaks from the water line laid by a plastic pipe passing through the left side of this line (see: point in photo FW-1)	 

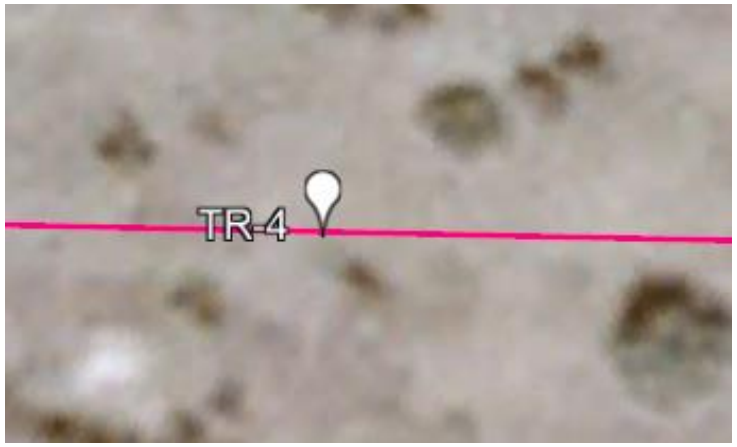
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
CR-3	356311.56	4423100.36	There is an empty plot of land not used for planting here.	
				

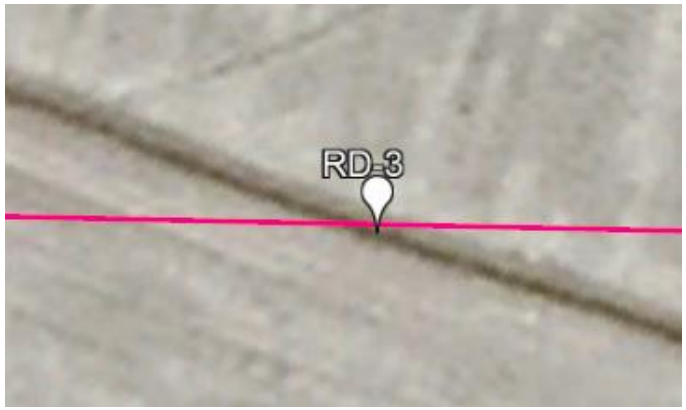
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
TR-1	355814.69	4422378.82	There is a shallow ditch passing perpendicular to the future route of 330 kV "Alyat SPP – Janub PP TL" at this point	 

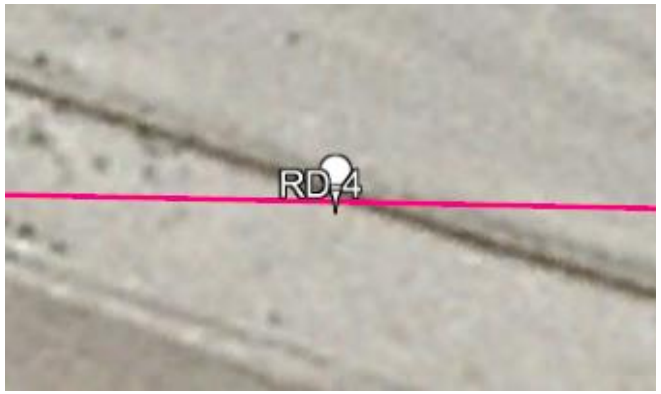
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-2	355667.95	4422161.92	At this point, the dirt road runs parallel to future route of 330 kV "Alyat SPP - Janub PP" TL.	 

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
TR-2	355658.18	4422150.04	The area is covered with sparse vegetation.	
				

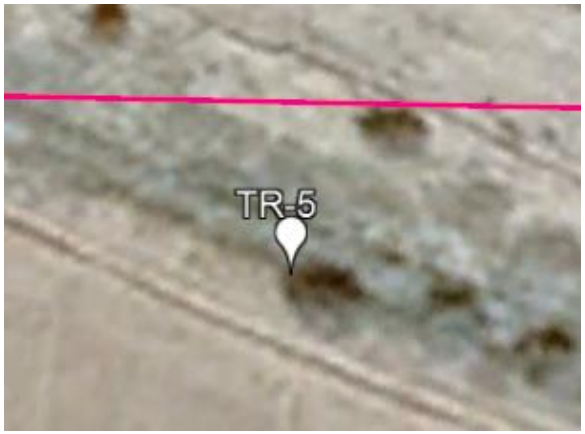
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
TR-3	355420.29	4422008.87	Two plastic water lines cross the future route of "Alyat SPP – Janub PP TL" and there are naturally growing tamariks bushes located in this area. The height of the bushes is less than 4-5 m.	 

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
TR-4	355256.21	4422014.04	The area consists of an empty area covered with naturally growing sparse tamariks and wormwood.	
				

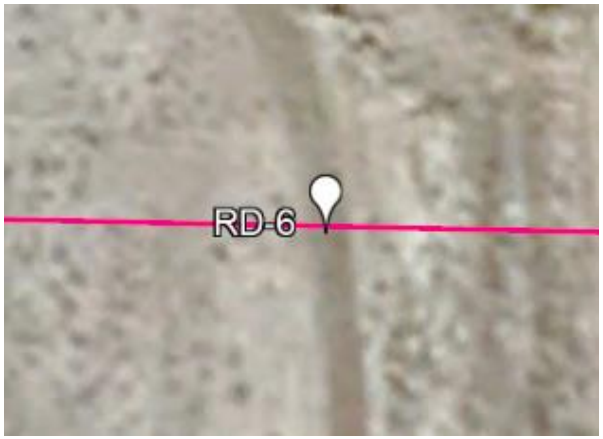
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-3	354833.92	4422033.16	From this point, there is a dirt road and through its right side is a shallow ditch pass.	
				

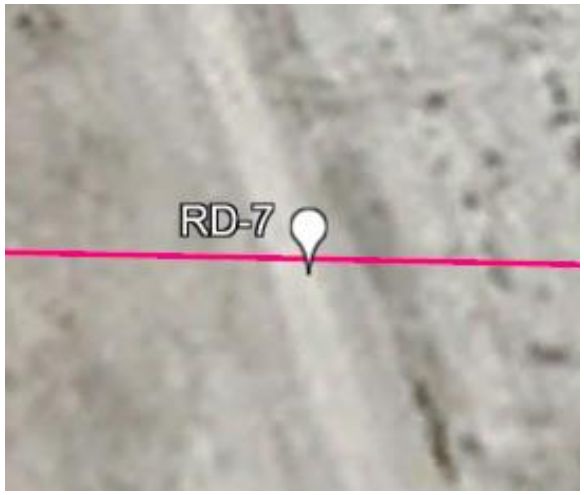
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-4	354729.07	4422034.96	From this point, a dirt road and a shallow ditch pass. Light-weight construction booth is located on the right side of the road.	 

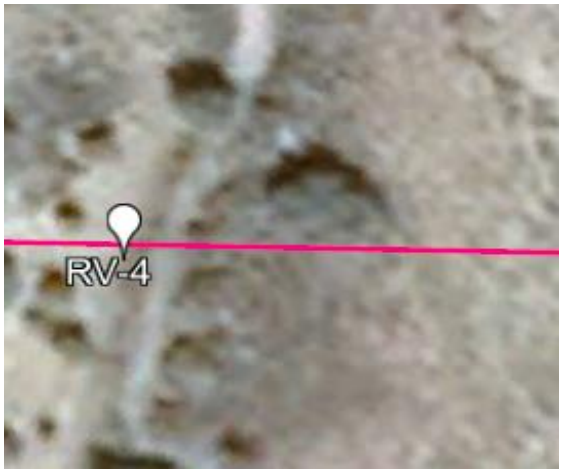
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
CR-4	354612.10	4422036.95	This point is an empty plot of land, through which a shallow ditch passes.	
				

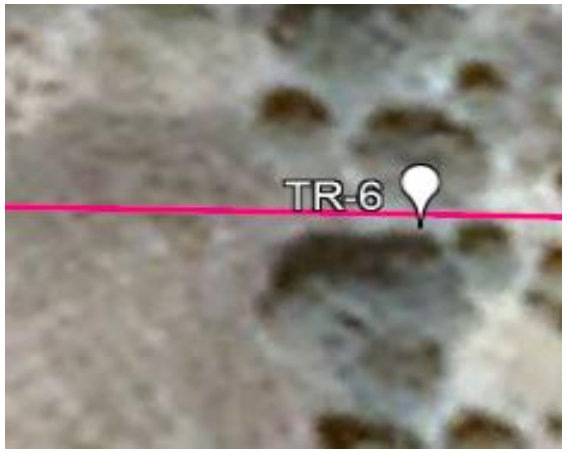
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
TR-5	354270.73	4422037.28	This point consists of an empty area with sparse tamariks bushes not exceeding 2-3 m in height.	
				

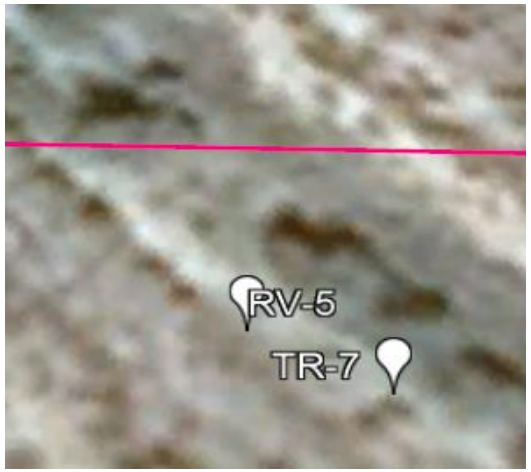
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-5	354218.67	4422062.14	From this point, a dirt road crosses the future route of "Alyat SPP – Janub PP" TL and ditch passes on its right side.	
				

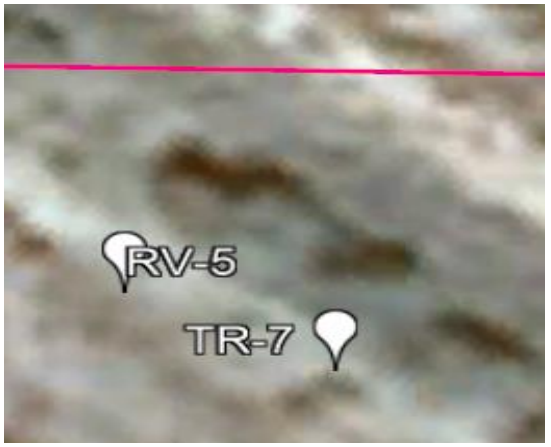
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-6	354038.42	4422065.55	From this point, there is a dirt road and on its right side shallow ditch pass.	 

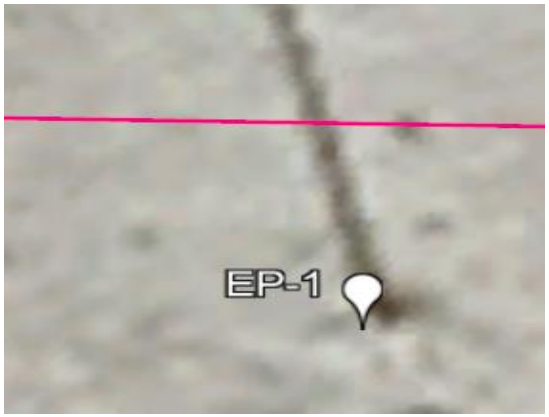
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-7	353733.10	4422074.88	From this point there is a dirt road and natural tamariks bushes on the right side of the road.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RV-4	353602.31	4422080.62	There is a massif of natural tamariks bushes at this point.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
TR-6	353589.93	4422082.19	There is a massif of densely growing natural tamariks bushes at this point, not exceeding 3-4 m in height.	 

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RV-5	353078.22	4422092.30	There is a massif of densely growing natural tamariks bushes at this point, not exceeding 3-4 m in height. A large-diameter pipeline runs on the right side of the bush in the south direction.	 

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
TR-7	352711.72	4422103.61	There is a massif of densely growing natural tamariks bushes at this point, not exceeding 3-4 m in height.	 

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
EP-1	352420.94	4422471.01	From this point, a plastic pipeline runs through the trench that crosses the future route of the "Alyat SPP – Janub PP" TL.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
BL-13	352016.87	4422145.79	At this point, a cattle farm is located approximately 400 m from the TL route.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-9	352016.39	4422163.67	At this point a dirt road is located, that crosses the TL route and then runs parallel to it.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
BL-14	351003.74	4422408.02	At this point there is a gas collection, processing and distribution station owned by SOCAR is located.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-10	350782.99	4422147.35	This point is the intersection place of two asphalt roads passing in front of the SOCAR-owned gas collection, processing and distribution station.	
				

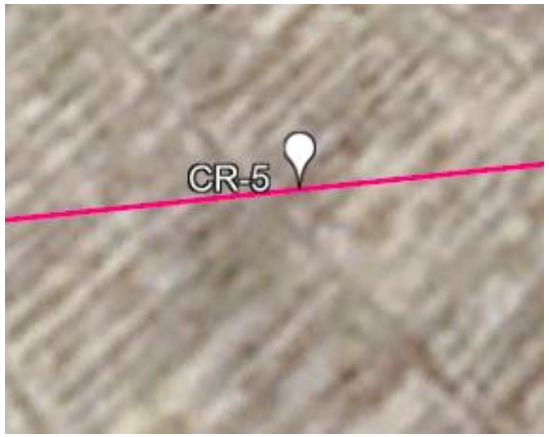
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-11	350059.19	4422068.70	At this point a dirt road is located that crosses the TL route and runs between two valleys.	 

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-12	349856.32	4422042.37	At this point a dirt road is located that crosses the TL route and runs through the valleys to SOCAR's gas processing plant.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
BL-15	349682.02	4422250.95	At this point the SOCAR's gas processing plant is located approximately 230 m to the right of the TL route.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
BL-1	349540.51	4422059.57	At this point, about 40 m from the TL route, there is a gas well fenced by SOCAR's iron grid.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-13	349473.04	4422016.97	At this point, there is a dirt road leading to the oil and gas fields is located. There are operating wells on the right side of the road.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
CR-5	349345.85	4421999.53	At this point, there is a dirt road leading to the oil and gas fields is located. The surrounding plots of land are not used for planting.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-14	349270.05	4421994.03	At this point, there is a dirt road leading to the oil and gas fields is located.	
				

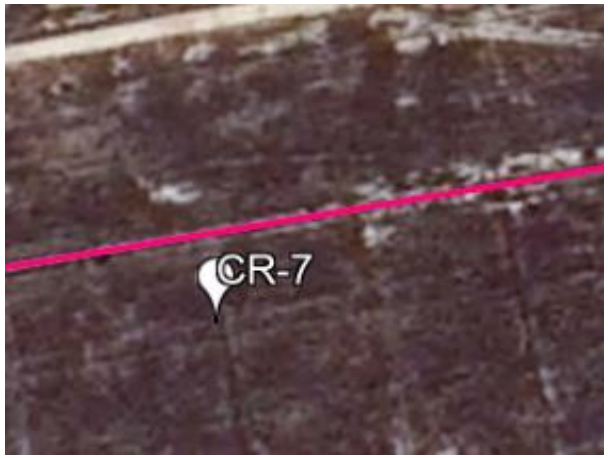
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
BL-16	349536.65	4421827.42	At this point, about 200 m from the TL route, there is a oil well fenced by SOCAR's iron grid.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-15	348989.40	4421969.34	At this point, there is a dirt road leading to the fields is located.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-16	348155.00	4421882.43	From this point, along the slope of the valley, a pipeline made of plastic pipe passes, that does not intersect with the TL route.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-17	347929.89	4421860.38	From this point a dirt road runs through the steppe, crossing the TL route.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
CR-6	345182.13	4421517.92	This area is a vacant plot of land with a relatively smooth relief, not used for agriculture and with sparse steppe vegetation.	 

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
CR-7	344525.39	4421403.38	This area is a vacant plot of land with a relatively smooth relief, not used for agriculture and with sparse steppe vegetation.	 

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-18	344079.44	4421348.82	From this point a dirt road runs parallel to the route of the future TL.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
BL-17	342843.17	4421340.47	At this point a cattle farm is located approximately 250 m to the right of the TL route. No one was on the farm during the inspection.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-19	342879.70	4421114.28	At this point a dirt road is located that crosses the TL route.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
TR-8	343044.13	4421139.69	There are sparsely grown tamariks bushes under natural conditions at this point. The height of the bushes does not exceed 2.5-3.0 m.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
FW-3	341390.96	4420906.18	At this point a large-diameter surface pipeline runs parallel to the future route of the TL.	
				
BL-18	340110.69	4420838.39	At this point a cattle farm is located approximately 350 m from the TL route.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
RV-6	339743.79	4421228.53	At this point, the TL route intersects with a natural depression approximately 5 m wide and 2 m deep. Water has accumulated in the depression as a result of a leak from a nearby pipeline.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RV-7	339664.09	4421213.40	This point is located on the right side of the TL route on the slope of a hill with sparse vegetation.	
				
RV-8	337975.57	4421179.18	At this point, the TL route intersects with a natural ravine. There was no water in the ravine during the observation.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
RV-9	337317.06	4421110.65	At this point, the TL route intersects with a natural ravine. From this point, a surface pipeline runs parallel to the TL route.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
GA-11	336537.31	4420853.26	The land at this point consists of natural tamariks bushes.	
				
RD-20	335917.09	4420968.33	From this point a dirt road runs near the existing pipeline parallel to the TL route.	

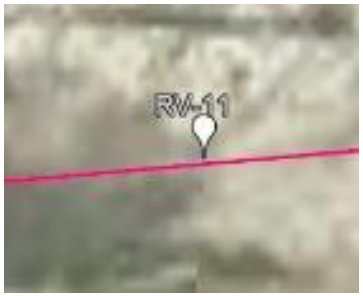
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
RD-21	335139.89	4420860.62	There is no road, crossing the TL, at this point.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
TR-9	335048.13	4420881.46	During the field observations, no greenery was found at this point, except for rare natural steppe plants.	
GA-1	334870.18	4420833.38	No greenery was found at this point during field observations.	 

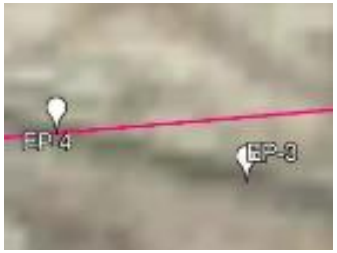
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
GA-2	334650.90	4420841.52	No greenery was found at this point during field observations.	
				
FW-4	334526.67	4420782.90	From this point a surface pipeline runs parallel to the TL route.	

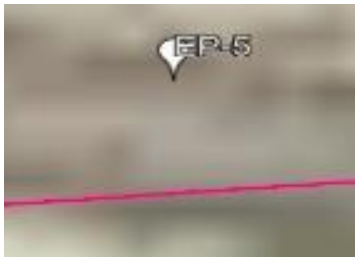
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
GA-3	334366.57	4420803.64	No greenery was found at this point, except for rare natural steppe plants.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
BL-19	333329.14	4420249.69	The Alat-Shirvan railway crosses the TL route from this point.	
				
RV-10	332879.07	4420680.59	From this point, a dirt road runs parallel to the TL route.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
RV-11	332745.94	4420670.56	At this point, the TL route intersects with a pipe crossing laid on the dirt road.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
GA-4	332568.78	4420643.03	At this point, greenery consisting of natural tamariks bushes was observed. The height of the bushes is not more than 2.0-3.0 m.	
				
RV-12	332101.51	4420618.26	There is a shallow depression that crosses the TL route at this point.	

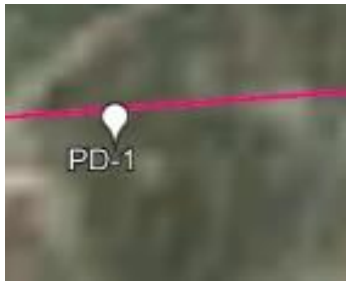
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
EP-3 EP-4	332042.83 331985.92	4420592.01 4420608.02	There are no electric towers at the points marked as EP-3 and EP-4 on KMZ-3 file.	
RL-2	331958.85	4420605.61	The Alyat-Shirvan railway crosses the TL route from this point.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
EP-5	331926.74	4420622.23	From this point, a low-voltage power line runs parallel to the Alyat-Shirvan railway.	
				

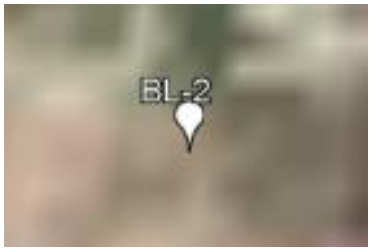
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
FW-5	331530.72	4420572.11	From this point, a surface pipeline runs parallel to the Alyat-Shirvan railway.	
				
GA-5	331465.10	4420550.37	No greenery or shrubs were observed at the point marked GA-5 in the KMZ-3 file.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
RD-22	331296.75	4420551.86	From this point a trench, excavated parallel to the surface pipeline, passes.	
				

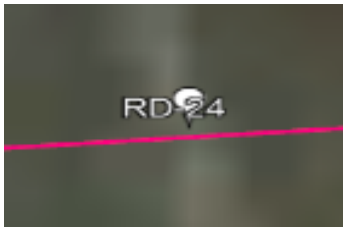
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
GA-6	331219.63	4420528.35	No greenery or shrubs were observed at the point marked GA-6 in the KMZ-3 file.	
RV-13	330937.36	4420524.15	No waterways, ditches or canals were found at the point marked as RV-13 in the KMZ-3 file.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
GA-7	330381.96	4420481.80	At this point, a small area of low tamariks bushes was observed.	
				
PD-1	330112.27	4420449.46	No natural or artificial water basins were found at the point marked as PD-1 in KMZ-3 file.	

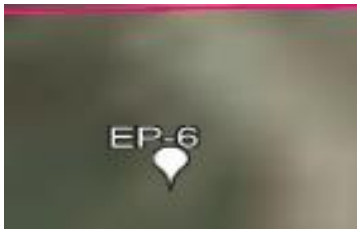
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
RV-14	330066.08	4420455.98	There is a relatively smooth plot of land without vegetation at this point.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
Fauna	-	-	On August 31, 2021, during the field studies, a jackal was found near the landfill in the outskirts of the Shirvan city.	
BL-2	330065.86	4420424.90	A livestock complex was observed at a distance of about 150 m from this point.	
				

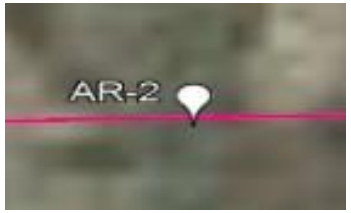
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
PD-2	329947.72	4420430.24	No water basin was observed at this point.	
				
PD-3	329397.28	4420396.35	No water basin was observed at this point.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-23	329146.27	4420390.63	At this point, a dirt road crossing the TL was observed.	
				
RD-24	328955.48	4420370.31	There is a dirt road crossing the TL route at this point.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-25	328878.72	4420369.42	At this point, traces of a dirt road intersecting with the TL route are visible.	
				
RD-26	328395.91	4420346.12	There is a dirt road crossing the TL route at this point.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
EP-6	328196.54	4420311.90	From this point, a high-voltage overhead power transmission line runs along the road crossing the TL route.	
				
RD-27	328196.77	4420345.20	From this point, a high-voltage overhead power transmission line runs along the road crossing the TL route.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
AR-1	328051.13	4420336.96	From this point a shallow canal runs, which intersects with the TL route.	
				
RV-15	327918.00	4420341.74		

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
			At this point, the TL route intersects with the Shirvan collector. The distance between the two sides of the collector on the ground surface is more than 200 m, the distance between the ground surface and the water level in the collector is about 50 m. This collector is the most serious obstacle that crosses the TL route.	
AR-2	327757.86	4420334.72	At this point, traces of a dirt road intersecting with the TL route were observed.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
GA-8	327687.94	4420321.03	The landscape at point GA-8 is the same as the landscape at point AR-2. A tamariks bush can be seen outside the TL route.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-28	327239.79	4420324.62	At this point, the TL route intersects with the dirt road.	
				
BL-20	326930.81	4419848.48	At this point, a livestock farm is located approximately 500 m from the TL route.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
RD-29	325753.63	420316.21	At this point, the TL route intersects with a 2 m deep ditch.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
EX-7	325716.03	4420307.99	The landscape at this point is the same as the landscape at RD-29 point.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
EX-6	325546.43	4420308.75	At this point, there is a vacant plot of land bordered by fill-in soil.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-30	325452.06	4420303.20	From this point, a dirt road extends in the direction of Shirvan city.	
				
GF-1	325198.71	4420314.44	There is an empty area of low hills at this point.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
RD-31	324966.91	4420302.45	From this point, a dirt road extends in the direction of Shirvan city. On the left side of the road, the towers of high-voltage overhead power lines are visible.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
TR-10	324889.23	4420309.67	This point is an empty area covered with low shrubs.	
				
GF-4	324564.88	4420011.57	At this point a lowland area, covered with low steppe vegetation, is located.	

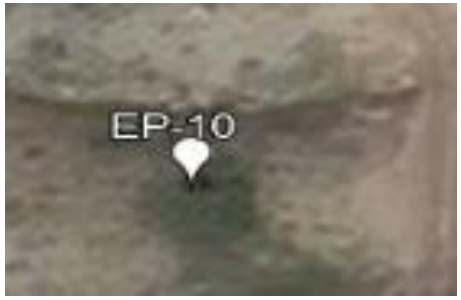
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
GF-5	324599.98	420239.94	There is a sparsely vegetated depression at this point. The towers of high-voltage overhead power lines can be seen in the area outside the TL route.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
EP-7	324530.46	4420281.38	From this point 4 OHLs parallel to each other pass at a certain distance.	
				
EP-2	324523.08	4420325.85	At this point, the same landscape is observed as at EP-7 point. From here 4 OHLs parallel to each other pass at a certain distance.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
EP-8	324510.91	4420270.67	From this point 2 PTL pass. are There are the remains of oil well of the Shirvan Oil operating company on the left side of the PTL.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
TR-11	324461.88	4420288.80	At this point vacant plot of land is located, consisting of depression covered with low shrubs. Several PTLs are visible ahead of this point.	
				
RV-16	324429.78	4420294.70	No waterway was observed at this point. The landascape is the same as at TR-11 point.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
EP-9	324367.77	4420276.57	Three PTLs parallel each other pass from this point. The relief of the area is relatively smooth and rises towards the Shirvan city.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
EP-11	324346.97	4420263.83	From this point 4 PTLs pass along the road, 2 on both sides of the road. Vegetation in the area is very poorly developed.	
				
EP-10	324337.75	4420307.21	The landscapefrom this point is the same as from EP-11 point. PTL passes through both sides of the road.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
FW-6	324074.06	4420292.88	Surface pipeline made of plastic pipe passes from this point.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
TR-12	323973.01	4420275.43	At this point, the TL route intersects with the existing dirt road.	
				
FW-7	323863.17	4420287.96	The landscape at this point is the same as at FW-6 point, plastic pipeline runs through the area in the direction of Shirvan city.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
BL-21	323699.02	4420562.13	This point is located about 300 m from the TL route. From this point high-voltage OHL passes, where administrative building and transmission station for mobile communications are located.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
EP-12	323713.53	4420332.16	From this point high-voltage OHL passes, there is a dirt road along the route of this line.	
				
RD-32	323740.93	4420285.37	From this point a dirt road runs in the direction of the Shirvan city, and the terrain rises towards the city. The vegetation of the area is very poorly developed.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
EP-13	323464.75	4420189.32	From this rising point, high-voltage OHL runs and dirt road passes under it.	

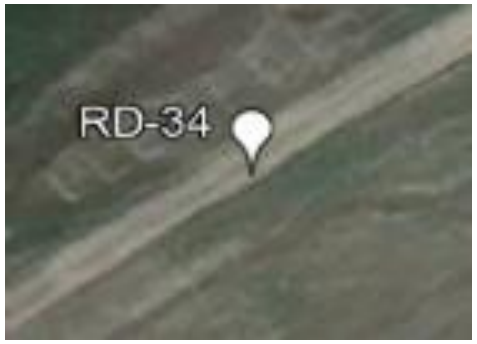
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
EP-14	323263.23	4420075.83	At this point, high-voltage OHL passes through the top of the hill. There is a dirt road running along its route.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-33	323246.80	420046.76	At this point, high-voltage OHL passes through the top of the hill. There is a dirt road running along its route.	
				
PD-4	322970.22	4419875.78	At this point, the terrain was complex and intersected by numerous hollows. There is a possibility of water accumulation in the hollows during heavy rains.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
EP-15	322925.09	4419845.32	At this point, OHLs pass over the high hills separated by a deep valley. The vegetation of the area is very poorly developed.	
				

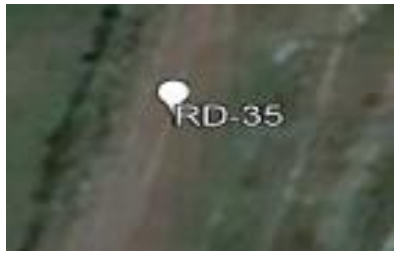
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
EP-16	322889.22	4419880.46	From this point, which has a relatively smooth relief, dirt road and low-voltage OHL pass.	
				
GA-9	322888.32	4419849.53	To the right and left of this point, dirt road with poorly developed vegetation passes.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
EX-8	322838.53	4419844.84	There are natural depressions at this point on the slope of the hill.	
				

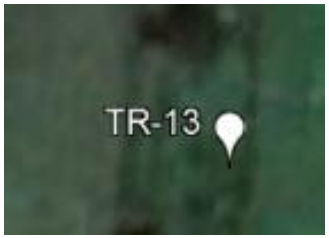
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-34	322830.21	4419821.08	Dirt road passes from this point. The left side of the road is a deep valley and the right side is a relatively smooth plain. Towers of the high-voltage OHL are visible ahead.	
				
GF-2	322733.07	4419771.36	Dirt road passes from this point. The left side of the road is a deep valley and the right side is a relatively smooth plain. Towers of the high-voltage OHL can be seen on the hill ahead.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
GF-3	322558.46	4419701.60	At this point, the landscape is similar to point GF-2, with high-voltage OHL towers on the slope of the opposite valley and on the top of the hill.	

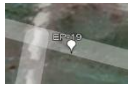
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
EP-17	322550.30	419653.27	From this point a dirt road passes, and this road passes through the valley in front and extends towards the hill. There are towers of high-voltage OHL the slope of the valley and on the top of the hill.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
FW-8	322417.88	4419621.09	From this point, a large-diameter surface pipeline passes through the dirt road and the right side of the road. There are towers of high-voltage OHL on the slope and above the hill in front.	 
RD-35	322396.31	4419601.35	From this point a dirt road extends to the hill in front, and high and low voltage OHLs pass on the right and left sides of the road.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
GA-10	322363.04	419607.01	At this point an artificially planted garden is located in th area fenced with iron bars. Some trees are more than 5-6 m high.	
				

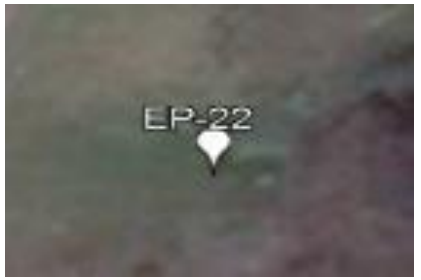
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
TR-13	322371.78	4419615.68	At this point the naturally growing tamariks bushes and the PTL passing through them are located. The height of some trees is about 5-6 m.	
				
BL-3	322305.98	4419599.10	At this point the private yard area is located, PTL passes behind it. The approximate height of the trees in the yard reaches 8-10 m.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
RD-36	322329.41	4419573.21	From this point, on the right and left sides, dirt road passes with naturally growing tamariks bushes. Currently, an underground pipeline, crossing the dirt road, is under construction here.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
EP-18	322343.43	4419559.15	The area at this point is covered with naturally growing shrubs. There are trees planted on the side of the road, reaching a height of 7-8 m, on the left side of the area.	
				
EP-19	322307.02	4419565.49	Numerous PTLs pass through this point, which is densely covered with natural vegetation. The height of the bushes doesn't exceed 1.5-2.0 m.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
EP-20	322304.51	4419545.82	As in the point EP-19, the area at this point has dense natural vegetation reaching up to 5-6 m in some places. Numerous EVXs pass through the area.	
				
EP-21	322263.91	4419567.89		

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
			The land at this point is densely covered with naturally growing tamariks and other steppe plants. Sahədən EVX-i keçir. There are artificially planted trees up to 6-8 m in height on the left side of the area.	
GA-12	322338.19	4419505.37	This point is covered with naturally growing shrubs and artificially planted trees up to 5-6 m in height. PTL passes through the area.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
EP-22	322251.25	4419542.80	The PTL passes through this area, which is covered with tamariks bushes up to 5-6 m high.	
				
BL-4	322257.04	4419514.41	The area has sparse natural vegetation and 5-6 m high trees and booth from stone. PTL passes through the area.	

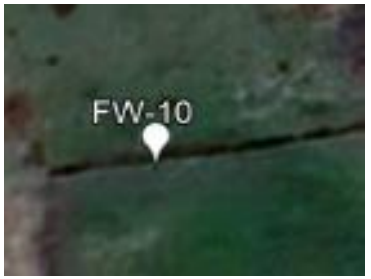
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
EP-23	322246.73	4419511.84	PTL passes through this depression, covered with natural vegetation.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
TR-14	322165.99	4419511.96	At this point, on the right side of the main asphalt road, green zone consisting of 6-8 m high pine trees is located.	
				
RD-37	322141.32	4419502.33	At this point main asphalt road is located,connecting the Shirvan city with its settlements. The high-voltage PTL crosses this road in several places.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
BL-5	322097.88	4419485.20	From this point a dirt road passes, there are remnants of construction materials in the area, the area is crossed by numerous EVX.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
EP-24	322090.74	4419470.31	Numerous high and low voltage PTLs pass through this area covered with sparse vegetation.	
				
BL-6	322096.06	4419436.94	At this point, the remains of a former car wash are located on a plot of land fenced with metal mesh.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
BL-7	322088.95	4419407.31	At this point, there is a one-story building on a vacant plot of land covered with gravel. There are trees more than 10 m high on the left side of the building. Several high-voltage PTLs pass behind the building.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
TA-15	322055.22	4419394.77	There are naturally growing tamariks bushes up to 6-8 m high at this point. High-voltage PTL passes through the right side of the area.	
				
FW-10	322056.21	419332.08		

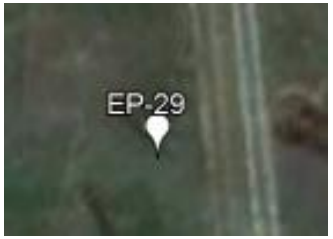
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
			At this point plot of land fenced with a metal mesh and covered with natural vegetation is located. A low-pressure gas pipeline passes through the land. Trees up to 8-10 m high have been planted on the left side of the area.	
EX-5	322006.08	4419327.63	Several surface pipelines pass through this point. There is a pile of soil excavated from a previously dug trench in the area. The area is covered with tamariks and sparse steppe plants.	 

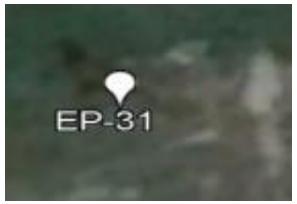
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
FW-9	322023.10	4419306.39	Several surface pipelines and concrete trays pass through this point; there are remnants of an abandoned oil well behind the pipeline and high-voltage power lines running to the Janub PP.	
				
EP-25	321983.27	4419305.87	At this point, 3 high-voltage PTLs going to the Janub PP and concrete tray parallel to these lines are passing. The area is covered with low shrubs.	

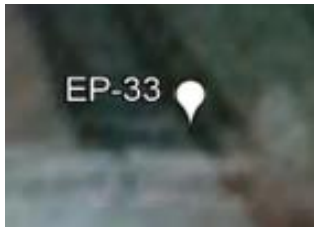
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
EX-4	322030.14	4419221.34	Several pipelines, intersecting each other, run from this point. There is a pile of soil left from excavations in the area. The area is covered with sparse natural vegetation.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
EP-27	322041.50	4419178.24	There are several pipelines crossing the asphalt road At this point. There is surface pipeline on the right side of the road, and there are trees up to 6-8 m high on both sides.	
				
RD-38	322020.30	4419174.22	At this point, asphalt road with numerous power lines over it, and lighting poles on the right side are located. Natural shrubs grow on both sides of the road.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
EP-26	322042.96	4419166.49	There are no electric or lighting poles at this point.	
EP-28	322007.15	4419103.78	Numerous PTLs of different voltage pass through this area covered with low natural vegetation.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
EP-29	322048.33	4419087.58	Several PTLs and pipelines, crossing them, and concrete trays are located in this area, which is densely covered with low vegetation.	
				
EP-30	322047.14	4419076.66	The landscape at this point is the same as at point EP-29.	

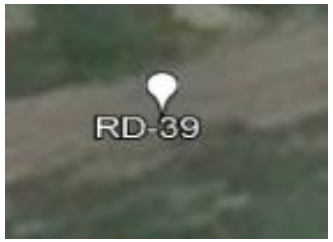
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
EP-31	322025.37	4419076.36	Numerous OHLs and surface pipelines intersect at this point, which is densely covered with low natural vegetation.	
				
EP-32	322014.10	4419075.38	Numerous OHLs intersect at this point, densely covered with low natural vegetation.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
EP-33	322008.37	4419073.76	Numerous OHLs pass parallel to each other from this point, which is densely covered with low natural vegetation.	
				
EP-34	322069.21	4419035.10		

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
			From this point surface pipelines, parallel to each other and the PTL, crossing them, pass. There are stone building and trees up to 6-8 m high behind the pipes. The area is densely covered with natural vegetation.	
EP-35	322044.18	4419022.80	From this point, surface pipelines, parallel to each other, and numerous high-voltage PTLs pass. The area is densely covered with low natural vegetation.	 

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
PD-5	322059.14	4418955.79	At this point, the area consists of a waterless depression densely covered with low natural vegetation.	
				
EP-36	322081.97	4418881.29	Numerous PTLs intersect at this point, densely covered with low natural vegetation.	
				

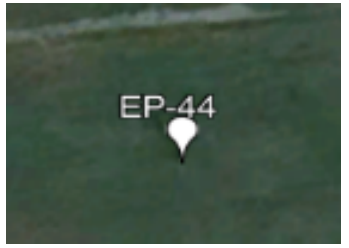
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
EP-37	322084.01	4418869.32	Numerous PTLs and surface pipelines run parallel to each other through this area, which is sparsely covered with low natural vegetation.	
				
EP-38	322046.93	4418888.53	Numerous PTLs intersect at this point, densely covered with low natural vegetation.	
				

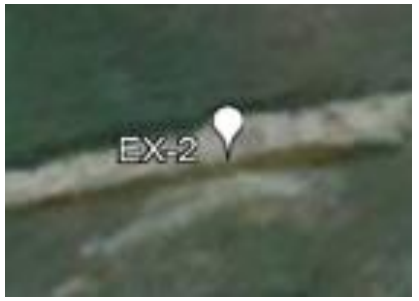
Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
RD-39	322063.22	4418870.34	This point consists of dirt road that passes through the area densely covered with low vegetation. High-voltage PTL passes through the left side of the road.	
				
EP-39	322037.90	4418833.66	On the left side of the area at this point surface gas pipeline passes, and in the middle high-voltage OHL going in / out to the Janub PP passes.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
FW-11	322075.86	4418748.49	From this point surface pipeline runs, crossing the existing high-voltage OHL. The area is densely covered with natural vegetation	
				
EP-40	322067.22	4418658.42	The photo taken at this point shows the Janub PP in the background and the high-voltage air EVXs going in / out there, as well as the overhead pipeline on the left. The area is densely covered with low natural vegetation.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
EP-41	322121.20	4418590.91	This area, densely covered with low natural vegetation, is a natural depression and OHLs are visible in the background.	
				
EP-42	322071.14	4418585.96	From this point high-voltage PTL going to / from the Janub PP passes. The area is covered with low natural vegetation.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
EX-3	322101.99	418558.72	There is an arch covered with natural vegetation in this area, where many high and low voltage OHLs pass parallel and intersecting.	
				
EP-43	322077.84	4418546.69		

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
			Numerous PTLs run parallel to each other in this area, which is densely covered with low natural vegetation. There is a production building on the left side of the area.	
EP-44	322110.61	4418527.41	Numerous PTLs run parallel to each other in this area, which is densely covered with low natural vegetation.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
EX-2	322120.21	4418442.10	No boring works were observed at EX-2 point.	
RD-40	322124.49	4418423.87	The area at this point consists of two dirt road forks. Dense low natural plants grow around the dirt roads. High-voltage OHL and pipes of industrial enterprise are visible in the background.	 

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
BL-8	322131.73	4418375.94	The area at this point consists of empty depression covered with low dense vegetation, and no structures have been observed here.	
				
EP-45	322098.65	4418367.09	The high voltage PTL located at this point is situated in the immediate vicinity of the Janub PP. There are parallel air PTLs in this area at close distance.	

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
				
BL-9	322132.77	4418317.07	No buildings were found at this point.	
EX-1	322100.72	4418288.02		

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
			At this point, trench extends between numerous OHLs, which are parallel to each other. There was no water in the trench at the time of observation. The surrounding area is covered with dense natural vegetation.	
EP-46	322116.92	4418258.08	At this point, the last high-voltage OHLs going to / from the Janub PP were observed.	
				

Location ID	Coordinates		Description	Number of point in KMZ file (above) / Actual photo of point (below)
FW-12	322114.25	4418244.23	Remains of previous excavations were found in this area adjacent to the fence of the Janub PP building.	
				

Appendix D July 2020 Biodiversity and Cultural Heritage Survey Report

Report
on field study for biodiversity and cultural heritage at the prospective construction site of 200 MW Photoelectric (solar) power plant in Baku City

1.0. INTRODUCTION

This summary report contains information on field studies carried out in the area of the planned construction of 200 MW Photoelectric (solar) power plant in Baku City for the determination of the presence of flora species and types of habitats, as well as cultural heritage sites in order to ensure subsequent analysis and assessment of environmental and social Impacts (ESIA).

2.0. OBJECTIVES

The study aimed to collection of data and information to describe the current state of flora and vegetation, as well as cultural heritage sites in the survey area and provide a forecast of possible impacts.

Fieldwork was prioritized for the following activities:

In the field of biodiversity:

- identification of the species of fauna and flora present in the project site, with particular regard to species being of interest from the point of view of conservation, including:
  - species protected by local and international laws and conventions (e.g. protected by the Habitats Directive, Appendix II, Berne Convention and CITES Convention);
  - species under the threat of destruction according to the local and world Red Books (critically endangered, endangered and vulnerable);
  - endemic and / or species in a narrow range;
- assessment of the presence of sensitive habitats in the Project area of influence and in the wider vicinity;
- description and photographing of the identified representatives of fauna and flora and determination of the coordinates of the area of their presence using a portable GPS device.

In the field of cultural heritage:

- identification of the presence and signs of archaeological sites and objects of formal and informal cultural heritage;
- assessment of the presence of sensitive areas of archaeological and cultural heritage in the project site and in the wider surroundings;
- description and photographing of the identified objects and determination of their coordinates using GPS device;
- preparation of proposals for detailed study when identifying architectural or other objects of international or national value.

The data collected during fieldwork should answer the following key basic questions:

1. What is the distribution, phenology and conservation status of the flora present in the survey area?
2. What types of vegetation / habitats are present in the survey area and what is their distribution and conservation status?
3. What archaeological, historical, cultural objects and objects of formal and informal cultural heritage are present in the survey area and what is their state of conservation?

3.0. THE LEGISLATIVE BASIS

Field studies have been carried out in accordance with the requirements of national laws and regulations, International Conventions, which Azerbaijan has joined, as well as in accordance with the IFC Performance Standards. The main legislative documents, establishing the requirements for environmental assessment, are presented below:

Laws of Azerbaijan Republic:

- "On Environmental Protection" dated 08.07.1999, No. 678-IQ;
- "On the animal world" dated 07.07.1999, No. 675-IQ;
- "On the protection of green plantations" dated 02.05.2014, No. 975-IVQ;
- "On the Protection of Historical and Cultural Monuments" dated 10.04.1998, No. 470-IQ.

National programs:

- "National Strategy of the Azerbaijan Republic in the field of protection and sustainable development of biodiversity in Azerbaijan".

International conventions:

- "On International Trade in Endangered Species of Wild Fauna and Flora," CITES (Rio de Janeiro, 1992);
- "On Wetlands of International Importance, Mainly for Waterfowl Habitats" (Berne, 1979);
- "On the protection of wild fauna and flora and natural habitats in Europe";
- "On biological diversity", (Rio de Janeiro, 1992);
- "On the protection of the world cultural and natural heritage", (Paris, 1972);
- IFC Performance Standard "Biodiversity Conservation and Sustainable Management of Living Natural Resources".

4.0. FIELD WORK METHODOLOGY

Sampling points

The sampling points were located within the construction site of the photoelectric (solar) power plant (Fig. 1) and were selected as representative ones for the survey area from the point of view of:

- potential presence of species being of interest from the point of view of conservation: the sampling point included a natural habitat identified as having a high suitability for the presence of species being of interest from the point of view of conservation;
- the selection of the sampling point was especially focused on important bird habitats in their immediate vicinity.

The location of the sampling point, selected during the office studies phase, has been changed at the site due to inaccessibility, safety reasons, or other unforeseen problems.

The location of each sampling point was recorded using GPS (UTM 39 coordinate system) using a unique sampling point code for its identification.

A survey was carried out at each sampling point in order to identify the presence or absence of species being of interest for conservation.

Data acquisition

For each sampling point, at least the following data were collected:

- unique sampling point code;
- names of researchers;
- research date;
- GPS coordinates (UTM 39 system of coordinates);
- photograph's reference number;
- type of habitat / vegetation and brief description;
- the main species of flora and fauna presented and their range of coverage;
- the presence of major threat / concern (e.g. grazing, soil erosion, dust deposition) and level of concern (high, medium, low);
- any other information considered to be useful (e.g. any specific fauna activity, signs of recent flooding, possible future disturbances).

5.0. FIELD STUDIES

Field studies have been carried out during two days 28 - 29 July 2020 by project team of "Sulaco Ltd" company consisting of the Project Team Leader, specialist on biodiversity, archaeologist and surveyor.

On the first day of the site visit, the weather was mostly clear and sunny, the air temperature was 39 ° C, the wind speed was about 10-12 m / s, the visibility was good.

On the second day of the site visit, the weather was cloudy at times, the air temperature was 34 ° C, the wind speed was 12-15 m / s, the visibility was about 7 km, that made it possible to inspect the surrounding area of the site.

After arriving at the project area, first of all, the boundaries of the project area and the objects in it were determined, in accordance with the scheme indicated in the aerospace image of the area.

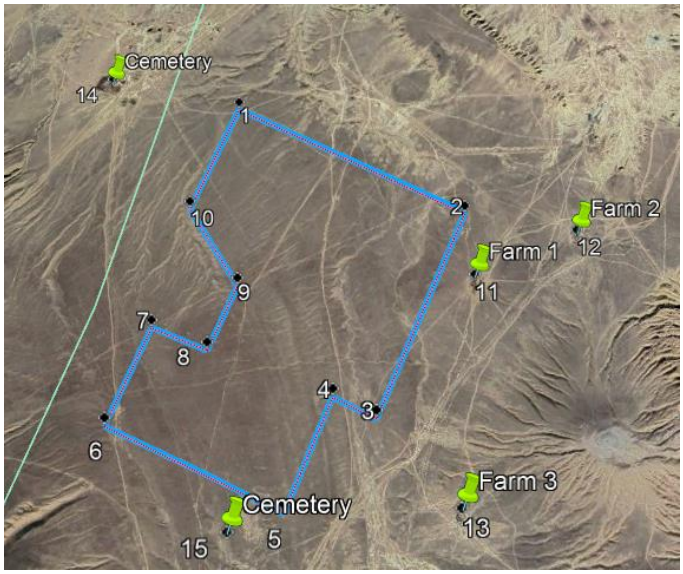


Figure 1. Project site and objects in its vicinity

The coordinates of the corner points of the project site in the UTM-39 system and the identified objects around it are given in the table below.

Table 1. Coordinates of the corner points of the project site and identified objects in its vicinity

Point No.	Point designation	Coordinates in UTM-39 system	
		X	Y
1.	North corner point of the project site	4434549,73	358239,87
2.	East corner point of the project site	4433392,55	360172,56
3.	Southeast corner point of the project site	4431520,50	359381,52
4.	Southeast corner point of the project site	4431707,54	359051,76
5.	South corner point of the project site	4430779,82	358687,79
6.	West corner point of the project site	4431495,58	357323,77
7.	Southwest corner point of the project site	4432339,36	357618,64
8.	Southwest corner point of the project site	4432131,58	358069,36
9.	Northwest corner point of the project site	4432717,27	358287,01
10.	Northwest corner point of the project site	4433481,57	357861,22
11.	Farm	4432717,07	360208,78
12.	Farm	4433133,35	361084,82
13.	Farm	4430727,92	359978,77
14.	New cemetery	4434837,66	357095,76
15.	Old cemetery	4430577,69	358283,08

Photo 1. Panorama of the area and definition of the boundaries of the project area

Due to the complicated relief, especially at points 1-6, the mobile network was often lost on the site, which impeded the GPS receiver and, therefore, the determination of the coordinates of some of the identified objects.

Before the commencement of the field studies, all available information about the project area, the presence of elements of biodiversity, potential archaeological, cultural and historical objects of local, national and international importance was collected and analyzed. In addition, the existing geographic and cartographic data related to the project site were reviewed.

It should be noted that, in general, there are very few references and available information that comprehensively describe the environment in the survey region, and especially within the local area indicated in the aerospace image of the area.

Field studies have been carried out by the method of visual observation of the objects under study by means of route walk on the territory of the site and in its vicinity.

6.0. DESCRIPTION OF THE PROJECT SITE AND ITS ENVIRONMENT

The survey area is located in the south-west of the Absheron Peninsula, 73 km west of Baku City, on the territory of the Karadag administrative district, on the eastern coast of the Caspian Sea. In terms of quality, the highway from Baku to the project site can be divided into three categories: from Baku to the entrance to the Gobustan settlement - the "Baku-Alat-Astara" main road - 1st category, from the Gobustan settlement to the Gobustan National Historical and Art reserve - asphalt road, in some places with a destroyed pavement - the 2nd category, from the reserve to the project site - dirt road of poor quality.

The project area refers to the coastal zone of the southeastern part of the Gobustan plain. The total area of the survey area is about 520 ha. The geographic landscape of the site is predominantly desert and semi-desert

The survey area is a continuation of Alyat anticlinorium and other geological structures of the Gobustan fold. The Alyat anticlinorium was formed by the Dashgal and Alyat anticlines. The Alyat marine anticline is located on the extension of this ridge, extending into the sea, and consists of productive stratum of rocks and recent Pliocene deposits.

The relief of the survey area is subject to significant impact of anthropogenic and natural factors. The degree of land erosion varies within 15-20%, which corresponds to the average risk of erosion. Plains and plateaus prevail within the boundaries of the project area, which belong to the accumulative-denudation type of the relief form. The relief in the southeastern part of the site is relatively smooth and has the shape of a plateau and stretches in the form of a strip approximately 1.5-2 km wide. The surface of the low-lying parts of the site is flat and has no cracks. The relief between corner points 1 and 10 of the site, especially outside them, is represented by deep dry ravines, gullies and badlands. This form of relief is also observed outside the project area. There is the world's largest concentration of mud volcanoes outside the project site, in the west and northwest.

According to the "Ecological Atlas" of the Azerbaijan Republic, the semi-arid, dry, moderately hot climate prevails in the region. The nature of the winds in the region is determined both by the large-scale influence of global atmospheric fronts and by the local atmospheric circulation and temperature conditions. The Caucasus mountains the in the west and the Caspian Sea in the east accelerate the passage through the territory of frequently recurring winds of north-east (25.6%) and north (23.8%) directions. Wind gusts up to 15 m / s occur at any time of the year, but more often in the summer. According to the data from Alyat weather station, the average annual wind speed is 4.6 m / s, the maximum speed can reach 28-32 m / s. In addition, according to statistics, the annual probability of calm weather is 22-25%.

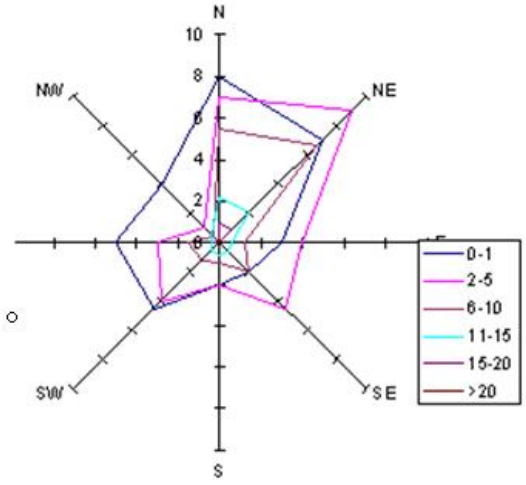


Figure 1. Prevailing wind directions for Alyat
(according to data from Alyat weather station)

The solar radiation level varies within 128-132 kcal / cm^2, the number of hours of sunshine is 2200-2400. The seismic zone of the survey area is more than 7 (>7). The diversity and phytomass of plant species are very scarce, the nature of the vegetation changes depending on the availability of water and its salinity., Ephemerals grow well at young age.

The soil in the survey area has a complex structure. This is caused by the value of the absolute height of the site, the variety of parent rocks, biological and hydrological conditions, etc. Moreover, the moisture parameters influence on soil forming. The arid climate creates favorable conditions for the formation of semi-desert landscape, as well as the corresponding type of soil and vegetation. In addition, the arid, moderately hot climate contributes to the formation of desert and semi-desert salt marshes, on which halophytes grow. Primeval gray salt marshes, consisting of gray soils, are widespread. According to the “Ecological Atlas” data, this type of soil was formed on recent alluvial-proluvial and deluvial sediments and has a rare vegetation cover. The humus content in these soils is 1.5-2% at high carbonate content and low nitrogen content. The mechanical composition is characterized by high degree of schistosity. These soils, formed under high aridity conditions, in summer cover with cracks here and there and look like takyr.

Photo 2. Mud volcano and topography forms near the northwestern boundaries of the project area

Photo 3. Relief forms in the center and in the southwestern part of the project area

During a visual inspection of the site, several metal poles (pipes) were found within it, apparently marking the conditional border of pastures of nearby farms.

In addition, the wellhead of old exploration well was discovered within the site, the purpose of which could not be determined.

Within the site, not far from the 5th point of the site boundary, 6 recently drilled exploration wells were discovered. Judging by the structures, these wells are observation wells and are intended for geotechnical investigations and observation of the groundwater level. In some places of the site artificially banked land plots of small size were discovered, apparently, they were created by local farmers some time and are intended for the rainfall collection.

Photo 4. Objects identified at the site during visual inspection

Several small farms identified during the site visit are the only residential settlements in the relatively close vicinity of the project site. Farms, in which farmers mainly keep cattle (cows, bulls), do not have fencing, consist of several primitive one-story buildings for living and keeping animals, reservoirs for drinking water and areas for haystacks. All farms have several vehicles for transporting animals, delivering food and hay. All farmers actively use the project site for grazing and driving livestock. Dirt roads crossing the site in all directions, as well as a temporary road along the gas pipeline route under construction, are the only roads connecting farms with the outside world.

Photo 5. Farms in the vicinity of the project site

Currently, in the northeast direction from the project site, at a distance of about 1.2 km or more from it, SOCAR contractors are building the “Babek-Umid” trunk gas pipeline with a diameter of 1000 mm, following from the Dashgil gas field to the Sangachal terminal. In order to manage construction in the field, a temporary construction camp is built near the gas processing plant of the Gobustan Operating Company.

Photo 6. Route of underground gas pipeline under construction

The air quality in the survey area is assessed as good, since there are no industrial facilities that pollute the atmosphere within a radius of about 3 km. However, in some places within the site, especially during northwest wind, the smell of manure from nearby farms is felt.

In addition, air quality is affected by trucks transporting construction materials from quarries located a few kilometers to the north from the site boundaries and by construction equipment of contractor organization, which constructs the underground gas pipeline.

During the pedestrian visual inspection of the site, contamination of the site with any industrial and household waste, including the concrete foundations of the drilling rigs, open ground oil sedimentation tanks, oil pollution in dry and liquid state, waterlogging, soil embankments, borrow pits and garbage dumps were not detected. Based on these signs, one can judge that the project site was not previously used for production purposes. In addition, there are no signs of cultivation on the site.

7.0. BIODIVERSITY

7.1. FLORA

In the period from 28 to 29 July 2020, the works were carried out to collect basic information and assess the state of flora and fauna at the prospective construction site of the photoelectric station. For the data collection, several areas and directions were selected, with the landscapes most typical for the area.

The project site is one of the poorly studied areas where herpetofloristic studies have not been carried out earlier. In the references on this area, there are only a few works on the study of fauna and flora, which are mainly descriptive and do not give a complete picture of the current state of the species.

The general more elevated and hilly character of the area, the presence of valleys with clayey slopes leave a peculiar mark on the semi-desert formations here. The zonal type of flora is the wormwood semi-desert, constantly disturbed by mesozonal groupings. The thickets of saltwort forming mixed formations with sagebrush, especially distributed in the central and southeastern parts of the project area, are very characteristic in weakly saline habitats.

In the survey area, the diversity and phytomass of plant species are very scarce, the nature of the vegetation changes depending on the availability of water and its salinity. Ephemerals grow well at young age.

Semi-desert vegetation covers a large area of the project site.

A relatively large number of ephemerals (plants adapted to living on saline soils (dry steppes, deserts, sea coasts, etc.)) are widespread in their natural form at the project site. This is due to the fact that the species composition of plant communities in the project area was formed under conditions of deficiency of moisture and mineral nutrition elements, high temperatures and excessive insolation. Saline soils are commonly encountered. The dominant type of vegetation on the site is steppe plants. In the composition of the vegetation cover, the genus of plants of the Amaranth family play the dominant role, prominent representative of which is *Salsola nodulosa* (*saltwort*).

This species, within its geographic range, is a part of various natural complexes and phytosenoses of the Absheron Peninsula.

The abundance of ephemers in the project site is associated with the climatic regime. Thus, the presence of a certain relationship between temperature and relative humidity forms the normal conditions for the development of ephemeral plants. Being semidesert plants, ephemerals and

epheroids in autumn (after precipitation) enter the phase of their phenological development and remain green all winter and early spring. By the end of May, they complete their phase of development. The ephemeral grasses of the site dry up in summer. Nevertheless, small shrubs: wormwood (*Artemisia fragrans*), Salsola nodulosa (*saltwort*) and other perennial grasses continue their dynamic development even in summer heat, in autumn they begin to bloom and seeds are formed. Vegetation is rarely found in rocky areas of the site.

Lands in the project area and in its vicinity are not cultivated, only some flooded areas are used for grazing livestock in spring and summer. In autumn and winter, on the contrary, arid areas rich of halophytes are used as grazing land.

Vegetation in the project area and outside it can be divided into two groups:

- Shrubs and halophytes growing in semi-desert areas of a significant part of the project area;
- Vegetation cover growing in flooded areas, ephemers, coastal plants growing on sand or in shallow lagoons.

Landscape changes to the northwest, southeast and south of the project site, as well as to the west, are characterized by a relatively large variety of vegetation cover. Growing on the salt marshes of the survey area are as follows: treelike saltwort (*Salsola dendroides*), fleshy saltwort (*Salsola crassa*), camel's thorn (*Alhagi pseudalhagilhagi*), and branchy tamarisk (*Tamarix ramosissima*). The Caspian saltwort (*Kalidium capsicum*), tumble-weed (camel's thorn) and ephemers are dominated on the clayey hills.

Common wormwood (*Artemisia absinthium*), kargan formation saltwort (*Salsoletum*), seepweed (*Suaeda*) and fleshy saltwort are found on the uplands.

Outside the project site, especially in the vicinity of farms and in the area of the new cemetery, the dominant vegetation is tamarisk - a shrub with no agricultural value.

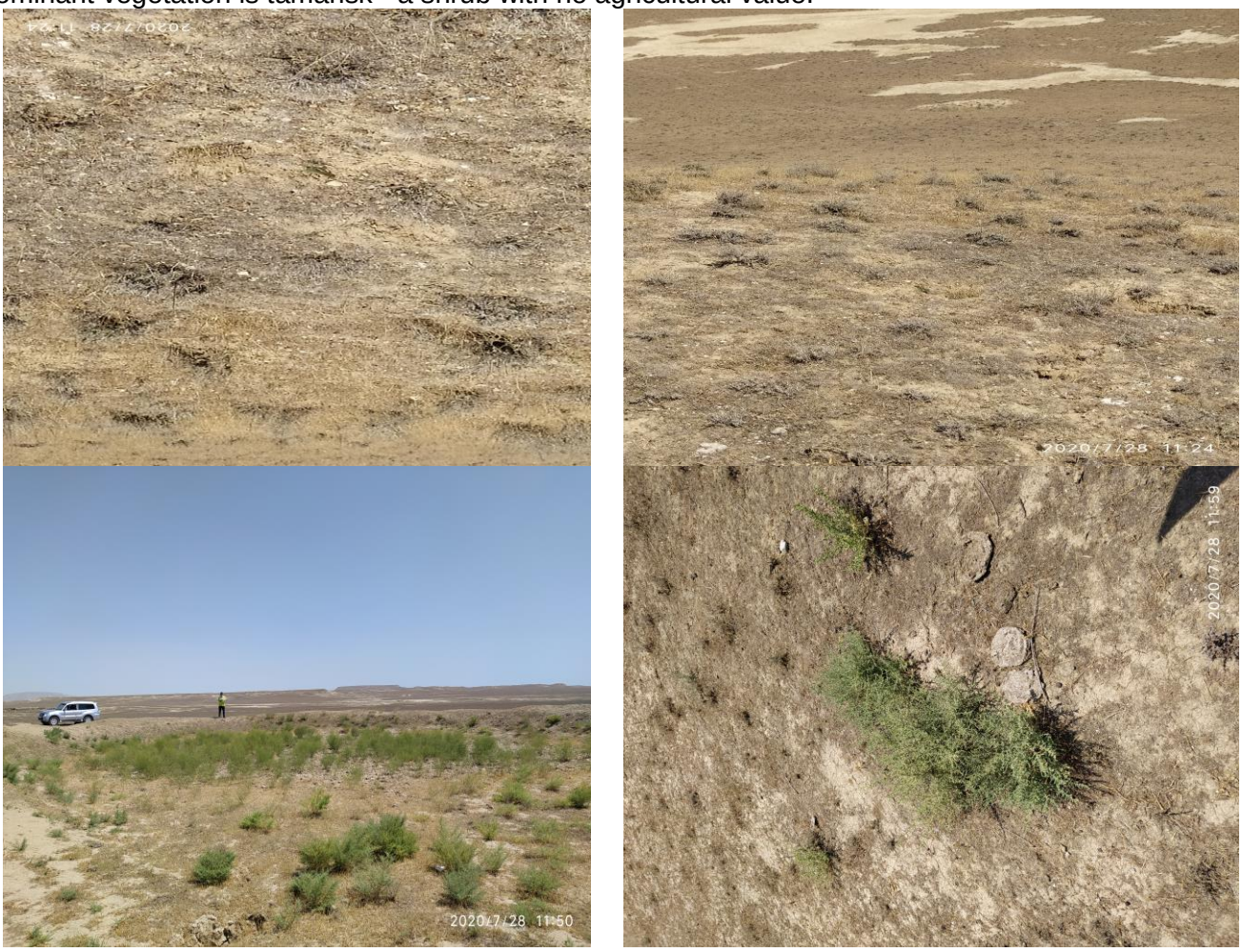


Photo 7. Vegetation cover in the project area

The project site is characterized by 2 floristic groups - desert flora (desert ephemers) and steppe flora. Below is a list of the main plant species belonging to each floristic group.

Desert flora:

- *Salsola dendroides;*
- *Salsola crassa;*
- *Suaeda dendroides – Seepweed – Çəyən;*
- *Salsola ericoides – Saltwort – Şorangə;*
- *Artemisia fragrans – Wormwood– Yovşan;*
- *Salicornia europeae - Saltwort – Şorangə.*

Steppe flora:

- *Alhagi pseudalhagilhagi;*
- Tamarix ramosissima*;*
- *Zerna rubens – Kocmep – Tonqalotu;*
- *Kalidium capsicum;*
- *Artemisia scoparia – Wormwood -Süpürgəvari yovşan;*
- *Artemisia absinthium;*
- *Artemisia lerchiana – Wormwood – Yovşan;*
- *Salsola nodulosa – Saltwort – Şorangə;*
- *Poa bulbosa –– Bulbous bluegrass - Soğanaqlı qırtıc;*
- *Suaeda.*

7.2. FAUNA

The life activity of the local population and long-term industrial activities outside the project area, as well as the desert and semi-desert landscape of the area significantly influenced the species diversity of the fauna in the project area.

At the same time, due to the lack of appropriate infrastructure and signs of development of the project site, it can be assumed that this area may still be a habitat for some rodents and a number of reptiles. This is evidenced by the numerous burrows of rodents found during the visual inspection of the site.

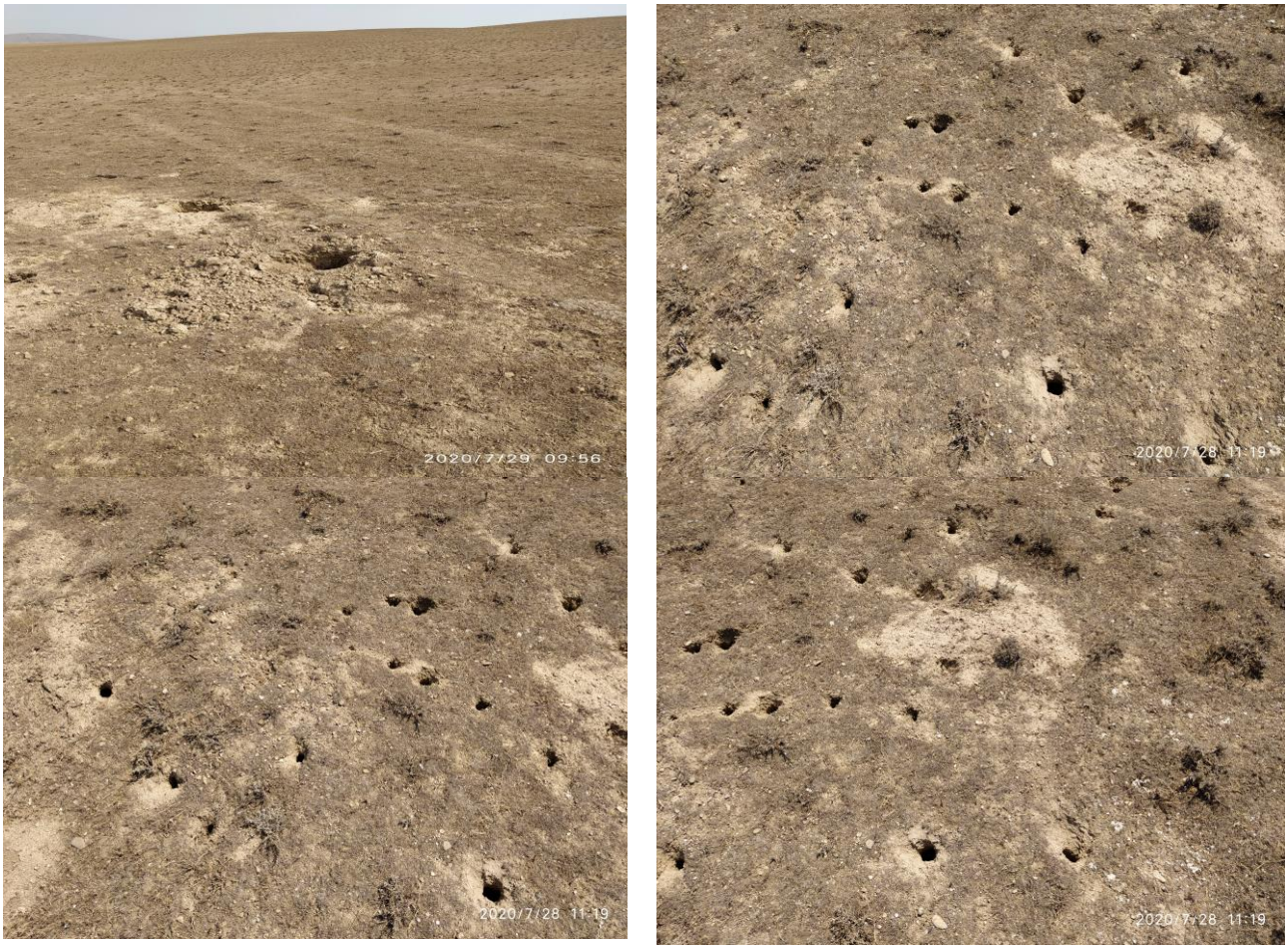


Photo 8. Burrows of field rodents found in the project site

Fauna diversity is relatively poorly developed in semi-desert environment. Visually encountered species include hares (*Lepus*), foxes (*Vulpes vulpes*), some rodents, a number of reptiles represented by snakes (*Vipera Libertina*) and lizards, and several bird species.

Common mammals in the project area include jackals (*Canis aureus*) and wolves (*Canis lipus*), which follow flocks of sheep to their wintering areas, and the red fox (*Vulpes vulpes*), which is one of the permanent inhabitants of the area. Other typical mammals include the hedgehog (*Hemiehinus auritus*), the hare (*Lepus europaeus*), and several house mouse species (*Mus muscus, Meriones erythrourus, and Microfus socialis*).

Birds are the largest number of vertebrates. Of these, during summer nesting, *Galerida cristata* and *Oenanthe isabellina* are the most numerous, *Alauda arvensis*, *Sturnus vulgaris* and *Corvus frugilegus* in winter. Common sparrow - *Passer domesticus* and blackbird - *Turdus merula* live here all year round.

The bird fauna includes the common kestrel (*Falco tinnunculus*), pigeons (*Columba livia*), pigeons (*Streptopelia turtur*), horned owls (*Athene noctua*), partridges (*Galerida cristata*), and isabelline wheatear (*Oennanthe isabellina*). *Oennanthe isabellina*, *Falconaumanni* and *Merops superciliosus*, *Remiz pendulinus*, *Lanius collurio* and *Lanius minor* and many other birds live in the area and breed in summer.

During the visual inspection of the site, the presence of the following species of fauna was identified:

Mammals:

- European brown hare - *Lepus europaeus;*
- Libyan jird - *Meriones erythrourus;*
- Gray rat - *Rattus norvegicus;*
- Jackal - *S.aureus;*
- Fox - *Vulpes vulpes;*

Reptiles:

- Caucasian agama - *Agama caucasica*;
- Racerunner - *Eremias velox*;
- Caucasian lizard - *Agama caucasica*;
- Blindworm - *Thyphlops vermicularis*;
- Lebetina viper - *Vipera lebetina*;
- Glass-lizard - *Ophisaurus apodus*.

Invertebrates:

- *Smaragdina limbata*;
- *Chrysolina chaleites*;
- *Polyphylla oliveri*;
- *Anthrenus scrophularia*;
- *Epicauta erythrocephala*;
- *Mylabris cincta*;
- *Dorcadion beckleri*;
- *Cleonus piger.*

Birds:

- House sparrow - *Passer domesticus Linnaeus;*
- Tree sparrow - *Passer montanus Linnaeus;*
- Common chat - *Oenanthe oenanthe Linnaeus;*
- Sky lark - *Alauda arvensis Linnaeus;*

- Horned lark - *Eremophila alpestris Linnaeus;*
- Crested lark - *Galerida cristata Linnaeus;*
- Common swallow - *Hirundo rustica Linnaeus;*
- Long-eared owl - *Asio otus Linnaeus;*
- Dove - *Streptopelia turtur;*
- Isabelline chat - *Oennanthe isabellina.*

During the site visit and during its visual inspection, the species of flora and fauna listed in the Red Book of Azerbaijan and the International Red Book, as well as critically endangered, endangered and vulnerable were not found.

7.3. CULTURAL HERITAGE

The desert and semi-desert landscape of the project site, the severe climate, scarce vegetation and the absence of natural water sources make the site unsuitable for its long-term settlement and habitability. Since ancient times this territory has been used by nomadic tribes as a pasture and for driving cattle to wintering areas.

During the visual inspection of the site, no direct or indirect evidence was found (cultural layer, remains of ancient settlements, household utensils, etc.) indicating the presence of any signs of an ancient settlement on this site. It is assumed that if there were, then evidence and elements of the ancient settlement could be buried under the soil heaps flowing with water from the steep slopes.

In this territory, the only resource of cultural heritage protected by the state is the Gobustan State Historical and Artistic Reserve, located approximately 7 km north-east of the project site. Brief information about the Gobustan reserve is given in section 7.4. of this Report.

At the northern border of the site, about 1.2 km north of it, there is a new Muslim cemetery, where the funeral continues to this day. This cemetery is the first sensitive site in the vicinity of the site.

The second, more ancient cemetery was found at the southern borders of the site, approximately 0.5 km from it. Judging by the inscriptions on the tombstones, there are graves here that have a date of the middle of the 19th century. At the same time, funerals are still going on in this cemetery, as evidenced by the relatively new graves and inscriptions on tombstones.

Since the field studies were carried out during the days of strict quarantine due to coronavirus infection, at the time of the survey, there were no people either on the site or outside of it. The absence of people made it difficult to obtain any additional information about the origin of the cemeteries from the local population.

It should be noted that all protected by the state historical, architectural and cultural objects located in Azerbaijan, including the Karadag District, are included in the List of immovable historical and cultural monuments of national importance, which was approved by the Resolution of the Cabinet of Ministers of the Azerbaijan Republic dated 02.08.2011 No. 132 The following table contains an extract from the above List, from which it is obvious that the cemeteries identified are not objects of cultural heritage protected by the state.

Table 2. The list of immovable historical and cultural monuments of national importance (approved by the Decree of the Cabinet of Ministers of the Azerbaijan Republic dated August 02, 2011 No. 132 (Annex 2))

Inventory number of the monument	Name of monument	Historical date	Address
Karadag District of Baku City			
(architectural monuments)			
105.	Caravanserai	XIV century	Karadag railway station
106.	Caravanserai (Karachi)	XV century	Sangachal settlement, Miejik territory
107.	Tomb of Sofi Hamid	XVII century	Sangachal settlement, Miejik territory
108.	Caravanserai	XV century	Поселок Сангачал
Archaeological sites			
492.	Ovdan (underground reservoir)	XVII century	Sangachal settlement,

			Miejik territory
493.	Ovdan (underground reservoir)	XV century	Sangachal settlement
494.	Ovdan (underground reservoir)	XV century	Sangachal settlement
495.	Ovdan (underground reservoir)	XVIII century	Bibi-Heybat station

As is obvious from the table, the identified cemeteries are not included in the List of immovable historical and cultural monuments of national importance, protected by the state. We think that it would be advisable to include these objects in the subject of social studies that will be carried out within the framework of this project. This will allow obtaining more detailed information from local communities about the significance of these cemeteries in the life of the local population.

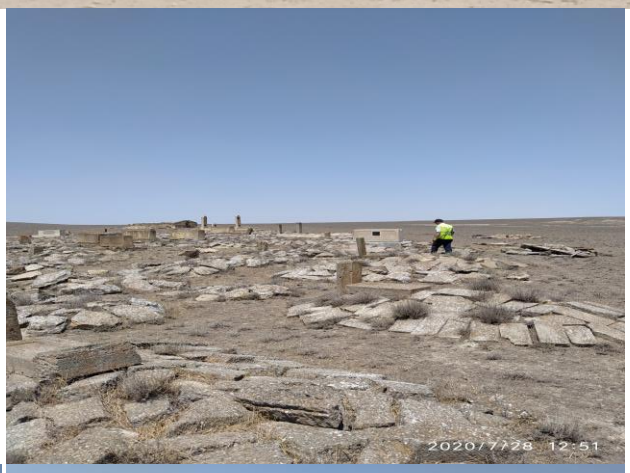



Photo 9. New and old cemeteries outside the project site

7.4. SPECIALLY PROTECTED TERRITORIES IN THE VICINITY OF THE PROJECT SITE

The closest to the project site protected natural areas are the “Gobustan” National Reserve and the “Shirvan” National Park, located 20 km south of Alyat.

Gobustan is one of the world's most famous historical and archaeological reserves, an open-air museum with a huge collection of priceless historical artifacts. The reserve was formed on September 9, 1966. The purpose of its activity is the protection of rock carvings, mounds, housing objects and their careful study.

The Gobustan Reserve is especially famous for its rock carvings made during the Mesolithic period. The most significant of this list are petroglyphs carved by primitive people on the walls of caves, rocks and boulders. They are able to tell the traveler about the culture, economy, worldview, customs and traditions of the ancient people who already at that distant time inhabited this abundant region of Azerbaijan.

As a result of archaeological research in the Gobustan Reserve, more than 6 thousand carvings on 1000 rocks, ancient dwellings - caves, about 40 mounds, more than 100 thousand objects of material culture were discovered. The most ancient carvings date back to the Mesolithic era, but it is assumed that life existed here before, which allows considering Gobustan one of the cradles of civilization. Research continues here so far.

In 2007, the Gobustan reserve was included in the UNESCO World Cultural Heritage List. Hundreds of tourists from dozens of countries around the world visit it every year.

Appendix E April 2021 Biodiversity Survey Report

April 2021

Sulaco Consulting & Engineering Co. Ltd

200 MWac Azerbaijan Solar PV Project

Report
on additional study of the general ecology and biological resources at the construction site of photovoltaic (solar) power plant with a capacity of 200 MW in Baku City and its surroundings

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INTRODUCTION

The results of environmental studies carried out in July 2020 showed that the available information on the biological resources of the area, where the "Photovoltaic (solar) power plant" is located, is limited, complete published data, specifically devoted to the flora and fauna just of the location site of the power plant and available information, comprehensively describing the environment in the region, especially on the territory of the project site, are not sufficient. In addition to the works already completed during the ESIA phase, the ESIA team, in order to understand the ecological function and value of the project area, identified the need for additional survey on the wider project area, including all aspects of development components.

This Report has been developed based on the results of additional field studies conducted from April 8 to 9 this year in the project site and the surrounding area, as well as studying the literature data in order to determine the general environmental characteristics and identify the presence of natural habitats of fauna and flora and supplement the basic information on the biological resources of the project site included in the ESIA, as well informing stakeholders about potential environmental receptors present on the site. The report contains more detailed information on the biological resources of the project site and its wider surroundings.

In order to supplement the ESIA with information on the characteristic of the baseline environment and biodiversity of the area, a collection, review and analysis of the available literature data and publications was carried out, which mainly include previous ECIAs carried out for other proposed (and in some cases never implemented) projects in the immediate vicinity of the project site.

1. Location of the project site

The project site is located in the east of the Azerbaijan Republic, in the desert and steppe coastal zone of the southeastern part of the Gobustan plain, in the south-west of the Absheron Peninsula, in the Garadag administrative district of Baku. The project site covers an area of approximately 550 ha, the distance from the site to Baku City is 60 km, and to the Caspian Sea is approximately 8 km. The closest settlements to the project site are the administrative units of the Garadag district - Gobustan and Alyat settlements- located approximately 5 km east and northeast of the site, , at a distance of 8 km southeast of the project site.

On the project site and beyond, especially in the coastal block, plateau and flat landforms prevail with a slope in the southwest direction. Taking into account the difficult topography, the elevation above sea level of the project site varies within + 100 to 80 m.

The project site is located in oil and gas field, the coastal block of contract area of southwest Gobustan. This territory is currently operated by the Gobustan Operating Company, which is part of the SOCAR structure. At some distance from the project site, there is a production base, gas processing units and 6 active, suspended and abandoned GOC gas wells.

The closest state-protected natural areas to the project site is the "Gobustan" National Reserve.

At some distance from the project site, the "Babek-Umid" underground gas pipeline passes,

which runs from the Dashgil gas field to the Sangachal terminal and the GOC gas pipeline, connecting the gas fields with a gas processing plant.
The "Baku-Alat-Astara" trunk road is located approximately 12 km southeast of the project site. The closest railway station is Sangachal station, located about 15 km east of the site.
In the immediate vicinity of the project area, 4 volcanoes were discovered, including 3 volcanoes located in the east (Goyarchin, Dilangaz and Dashgil), and 1 volcano located in the south (Goturdag).
There is no irrigation and collector-drainage network in the immediate vicinity of the project site and within 10 km radius from it.
The project site and its surroundings are actively used by nomadic tribes and local residents as winter pastures and for informal grazing of cattle and small cattle.
At present the government of Azerbaijan in order to facilitate the access of tourists to the group of volcanoes and improve the road infrastructure of local residents, has initiated the construction of a new two-lane local highway with a width of 8 m and a length of 21 km. The new road starts from the entrance to the Gobustan nature reserve and runs in the northeastern direction.
It is expected that the new road can significantly reduce the distance and facilitate access to the project site, provided that, starting from the entrance to the GOC's production base to the project site, the new road with a length of approximately 6.5 km will be built to replace the existing dirt road.

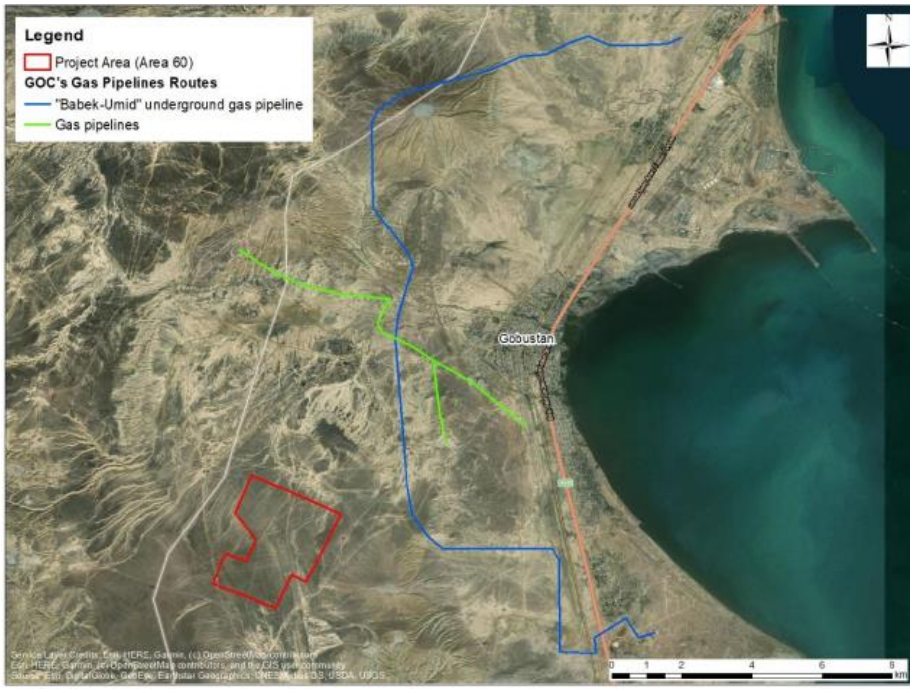

Figure 1: "Babek-Umid" gas pipeline and GOC's infrastructure (gas pipelines)

1.2. Project area, surrounding landscape and land features

The dominant geological structures of the Caspian region were formed during the period of tectonic movements that resulted in the formation of the Caucasus Mountains and the associated basin and plateau structures that form the Caspian and adjacent onshore regions.

Numerous erosional alterations to the landscape have occurred since the original structures were formed. Ensuing periods of tectonic compression (mainly during the Late Pliocene period) resulted in the production of a number of folded structures within the region, forming a number of anticlines (upward thrusting folds).
The Project Area is located on the Southeast end of the Greater Caucasus Mountains on the south-eastern part of Absheron peninsula, within the Samaxi-Gobustan structural zone. In this region topography is relatively flat near the shoreline. The Project area is located within a valley (Shachikaya wadi) characterized by relatively flat areas on which the Shachikaya Wadi and its tributaries are located and relatively high hills at the sides mainly characterized by mud volcanoes. (Figure 2).

Figure 2: General View from the Project Area showing Flat Areas, with typical surface conditions

The study area around the project site is characterized by tectonic and lithological features of the Cainozoic complex. The complicated structure of the topography is connected with this factor. Denudation and accumulation processes have played an important role in the formation of the geomorphological structure of this territory. During the Neotectonic period, these processes became more intenslve, and the topography of the area was subjected to strong weathering, owing to which the eminences were formed (including the 300-400 m high "mountains" of mud volcanoes), hills, valleys and ravines. In many cases, the tectonic

structure of the terrain corresponds to its geomorphological elements.
Beyond the project site, especially in the coastal block, plateau and flat landforms related to the accumulative-denudation type prevail. 7-10 km wide abrasive-accumulative plain extends along the Caspian Sea. In terms of geological age, this plain was formed in the Quaternary period.
In the north and south of this plain, in a relatively small area, the relief has the shape of a plateau. There are low hills and foothill types of relief In the central part. Mud uplands and coverings of the Pliocene-Quaternary period are widespread here. This type of relief in the form of a narrow strip extends to the west. Some parts of the coastal block, especially the eastern slopes of hills and highlands, have an escarp shape, i.e. the relief has a more or less steep stepped shape.

Figure 3. Landforms of the project site in different directions

1.3. Objects identified within a 10 km radius of the project site

The results of the repeat visit to the project site and adjacent territories, as well as field visual observations carried out by the "Sulaco" project team from April 9 to 10, 2021, confirmed that the project site and its surroundings are actively used for informal grazing of cattle and small cattle. The main land users located within a radius of 10 km from the project site are livestock farms in local and neighboring districts, which use a vast area for keeping cattle and small cattle and as a winter pasture.

Livestock breeding for nomadic tribes of this territory and residents of neighboring districts is a traditional perennial type of agricultural activity. The availability of large areas of natural pastures at low labor costs and means (availability of labor force, low cost of livestock keeping, biological value of grass cover, high productivity of livestock, etc.) allow for meat and milk production all year round.

Livestock farms located within a radius of 10 km from the project site are not located in a single massif, but in remote areas of different sizes. With the exception of one or two farms located outside the 10 km radius of the project site, the farms according to their organization and menage do not meet the requirements of modern livestock farms. Farms are mainly located in low-lying, non-flooded parts of the territory with a relatively calm relief, and pastures are located in hilly plains at a distance of about 3-5 km from farms and from each other, neighboring pastures do not have a dividing line and an artificial fence.

From small cattle, farms mainly keep rams, lambs and goats, and from cattle, cows, bulls, calves, as well as horses. The quantity of small cattle or cattle in different farms is different. The

number of heads in a flock of sheep on average ranges from 100 to 300, and in herds from 50 to 150 and more heads.
On farms, the animals are looked after and taken care of by shepherds or hired farmers from nearby villages, and guard dogs are used to guard the animals at night.
Farm buildings consist of one or more one-story primitive dwellings, buildings for storing tools and hay, summer pens and winter cattle barns, built in rows from local building material (brick) or other materials at hand. There are small backyards fenced with metal mesh near the dwellings in some farms, where fruit trees are planted. In addition, most farms keep small amount of poultry (chickens, geese, ducks). All farms have metal or concrete reservoirs of water for animal watering, and ponds near the farm are made from earthen dike, where rainwater is collected, and in the absence of rain, the ponds are filled with imported water. Depending on the location of the farm, drinking water and water for animals are brought either from the Gobustan settlement or from neighboring villages in the Hajigabul region.
All farms have one or more vehicles that are used to bring in and out animals, food, fodder and transport to the city and neighboring areas. The Power supply in farms are performed by diesel generators.
Manure is not removed from farms, but accumulates chaotically around farms, which leads to environmental pollution, the smell of manure spreads to several hundred meters from farms.
Some farms operate year-round, and some from September to mid-May next year, with the onset of warm months, flocks and herds are driven to mountain areas (Shamakhy, Gobustan, Guba, etc.).
Recently arranged area fenced with barbed wire with an approximate size of 8 x 12 m was discovered in the project site, 2 solar panels, antenna and boxes with equipment were installed inside the site. The site is covered with crushed stone. There is a guard cabin behind the site. Due to the lack of people and mobile communications, the purpose of the installation and its coordinates could not be determined. By visual inspection, it was determined that the installation is closer to the southern boundary of the site, where geological surveys were carried out last year.
In the north-west direction outside the site, a cemetery was discovered where the visitors were. Visitors were not allowed to photograph the object, because the object was photographed at some distance from it. According to one of the visitors, this cemetery belongs to the Shamly tribe living in the Gobustan settlement of the Garadag district and in some villages of the Hajigabul region.
This cemetery is not included in the list of objects in the Garadag district protected by the state.
Other objects located within a radius of 10 km of the project area are as follows: the Gobustan Nature Reserve (territory of 4,000 ha), the oil and gas infrastructure of the GOC, the suspended or abandoned wells of this company, the remains of an abandoned military training ground, artificial ponds, volcanoes, etc.
The coordinates of the objects identified during the visit to the site within an approximate radius of 10 km of the project area are presented in the table below.

Table 1. Information about the objects identified within a radius of 10 km of the project site

Point ID	Coordinates		Description	Photo
	Y	X		
ID-1	4432655,03	360309,33	Sheep and cattle farm	
ID-2	4433166,64	361255,89	Sheep and cattle farm	
ID-3	4433467,46	361532,11	Remains of oil well	
ID-4	4433872,75	362399,14	Remains of an abandoned military training ground	
ID-5	4434157,96	362407,39	Remains of an abandoned military training ground	

ID-6	4434708,18	362143,37	Remains of an abandoned farm	
ID-7	4436333,23	361013,30	Remains of oil well. The area around the well is contaminated with oil sludge.	
ID-8	4435100,74	360039,08	Artificial earthen ponds for animals' watering	
ID-9	4434745,84	359256,25	Sheep and cattle farm	
ID-10	4435432,51	357495,68	Sheep and cattle farm	
ID-11	4432332,64	354768,16	Sheep and cattle farm	

ID-12	4432094,56	354536,39	Sheep and cattle farm. An olive grove is planted near the farm on a 1 ha plot.	
ID-13	4432012,52	354312,11	Sheep and cattle farm	
ID-14	4431279,15	353936,98	Remains of a dried up artificial pond for animals' watering	
ID-15	4431918,54	355216,67	Sheep and cattle farm	
ID-16	4431388,80	356011,01	Remains of oil well. The area around the well is contaminated with oil sludge.	
ID-17	4430962,84	355405,10	Traces of an artificial earthern dike	

ID-18	4429730,38	358148,31	Artificial earthen pond for animals' watering	
ID-19	4429594,59	358419,90	Sheep and cattle farm	
ID-20	4427970,09	358486,41	Sheep and cattle farm	
ID-21	4430510,90	362692,91	Sheep and cattle farm	
ID-22	4438706.75	361290,42	GOC's Duvanny prduction base	
ID-23	4436571,00	362174,23	Operating GOC's gas well	

ID-24	4439195,66	360264,66	GOC's gas processing area	
ID-25	4438748,89	360283,70	Temporary construction camp of the "Babek-Umid" gas pipeline	
ID-26	4429518,05	360678,48	Extinct mud molcano	
ID-27	4428301,27	355698,36	Remains of GOC's oil well	
ID-28	443 8682,20	362519,18	Gobustan reserve	

ID-29	In the project area, close to the drilled geological wells.		Fenced plot with solar panels	
ID-30	4435327,02	357754,51	Fenced-in cemetery, where the funeral continues to this day.	

2. Biodiversity studies

2.1. Regional Study Area

The biological Regional Study Area (RSA) is an area containing a geographically distinct assemblage of species, natural communities, and environmental conditions. The RSA is defined in order to assess, based on literature review, the species and habitats potentially occurring within and in the vicinity of the Project.

The terrestrial RSA corresponds to the "PA1305 - Azerbaijan Shrub Desert and Steppe" which is considered part of the broader category "Deserts and Xeric Scrublands Biome". The extension of the ecoregion is showed in Figure 4.

Figure 4: PA1305 "Azerbaijan Shrub Desert and Steppe" ecoregion (Word Wildlife). The project site is indicated by the yellow square

2.2. Local Study Area

Within the 10 km radius of the project area, the Local Study Area (LSA) of the biodiversity includes all facilities related to the project area (oil and gas fields, roads, surface and underground pipelines, farms, etc.) and their expected Impact area.

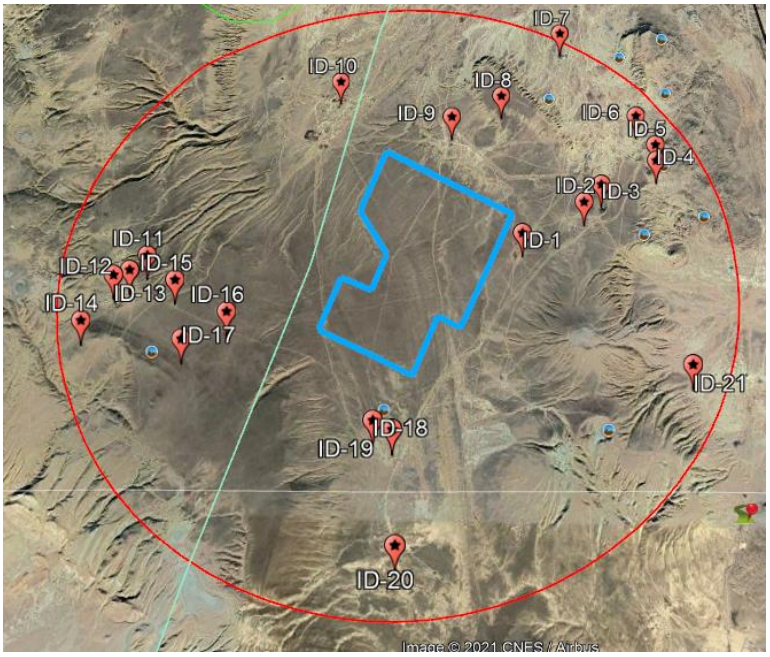

Figure 5. Aerospace photo of LSA around the project area

2.3. Methodology

The methodology for the preparation of the baseline assessment includes the following steps:

- literature review, including the review of existing reports and studies prepared for the Project;
- site visit;
- desktop analysis.

Key steps are outlined below.

Literature Review

The scientific literature review focused on the more extensive area in order to document species and habitat types potentially present in the study area with particular regard for potential priority biodiversity features and critical habitats criteria. In order to provide an overview of the biodiversity present in the area, scientific and official literature has been taken into account in addition to the current ESIA studies:

The literature review included the following sources:

- Scientific publications and other official publications:
- Azerbaijan Fifth National Report (CBD, 2014)
- Potential Analysis for Further Nature Conservation in Azerbaijan (2009)
- Red Book of Azerbaijan (2013)
- Biodiversity analysis update for Azerbaijan (USAID, 2010)

- Michael Heiss & Kai Gauger. 2011. Coastal Bird Migration at the Caspian Shore of the Azerbaijan Republic in October 2007. Podoces 2011. Vol. 6, No. 1

Review of ESIA studies and baseline reports prepared for other projects in the vicinity of the Site:

- ECOMERKEZ, 2011. Part I. The project "Environmental Baseline and Social Impact Assessment" in the site where Oil & Gas Processing and Petrochemical Complex to be constructed. Final Report
- ECOMERKEZ, 2011. Part II: Sosial Impact Assessment on project of construction of "Oil & Gas and Petrochemical Complex"
- ECOMERKEZ, 2011. Part III: Environmental positive impact assessment in connection with dismantling proper processing enterprises under Socar
- AA.VV., 2002. Azeri, Chirag And Gunashli Full Field Development Phase 1. Environmental and Socio-Economic Impact Assessment.
- AECOM, 2015a, for BP. Shallow Water Absheron Peninsula 3D Seismic Survey. Environmental and Socio-Economi Impact Assessment.
- AECOM, 2015b, for BP. Shallow Water Absheron Peninsula 2D Seismic Survey. Environmental and Socio-Economic Impact Assessment: 254 pp.
- GOC, 2014, Environmental Impact Assessment during planned well drilling in the Southwest Contract area. 218 pages.
- GOC, Environmental Impact Assessment during Drilling of New Exploration and Evaluation Wells in the Coastal Block of the Southwest Gobustan Agreement Area. 192 pages.
- MENR, State Strategy for the "Use of Alternative and Renewable Energy Sources 2015-2020", Strategic Environmental Assessment Report Project, 121 pages.
- Golder 2015. SOCAR Polymer. Environmental and Social Impact Assessment (ESIA) for PP & HDPE Plant
- Golder 2017. SOCAR GPC LLC. ESIA Scoping. Gas Processing Plant & Polyethylene Plant Project
- BP, 2002. Shah Deniz gas Export Project Stage 1 Development. Executive summary

Web sources:

- MENR, http://eco.gov.az
- The IUCN Red List of Threatened Species. Version 2016-3. <www.iucnredlist.org>
- WWF database (http://www.worldwildlife.org/ecoregions)
- Birdlife International (http://www.birdlife.org/)
- Ramsar Convention website (http://www.ramsar.org/)
- IUCN World Database on Protected Areas (https://www.iucn.org/theme/protected-

areas/our- work/parks-achieving-quality-and-effectiveness/world-database-protected-areas-wdpa)

- World Database on Protected Areas (http://www.protectedplanet.net/)

Based on the results of the literature review a list of potential flora and fauna species present in the RSA and LSA was created. The global and national conservation status and the endemism of each relevant species was also noted. A legend of the categories used is presented in the lists below:
IUCN Global Red List Categories

- CR: Critically Endangered.
- EN: Endangered.
- VU: Vulnerable.
- LR: Lower Risk.
- NT: Near Threatened.
- LC: Least Concern.
- DD: Data Deficient.

Bern Convention on the Conservation of European Wildlife and Natural Habitats (Bern):

- Appendix-I: Strictly protected flora species.
- Appendix-II: Strictly protected fauna species.
- Appendix-III: Protected fauna species.
- Appendix-IV: Prohibited means and methods of killing, capture and other exploitation.

Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)
The presence of the species in the *Red Book of the Republic of Azerbaijan* was also considered.

The presence and main characteristics of protected areas and internationally recognized areas within 10 km and more from the LSA was also assessed through literature review.

Site Visit

A site visit was performed within the LSA the 9th, 10th and 19th of april 2021 by "Sulaco" Ltd experts. A walk over survey was performed with the aim of understanding the ecological characteristics of the project site and of the LSA and to identify the presence of natural habitats and habitats suitable for flora and fauna species. Photographic documentation and GPS points were collected during the site visit.

Desktop analysis

The data collected during the literature review and the observation performed during the site visit were combined and analysed.

Data collected during the literature review and field studies on terrestrial flora, fauna, and habitats allowed evaluating the presence of significant biodiversity features and critical habitats within the terrestrial LSA. The critical habitat assessment focused in particular on the identification of the presence of the elements listed below (IFC PS6):

- presence of natural habitats;
- presence of potential critical habitats, triggered by the following five criteria:
- habitat of significant importance to Critically Endangered and/or Endangered species;
- habitat of significant importance to endemic and/or restricted-range species;
- habitat supporting globally significant concentrations of migratory species and/or congregatory species;
- highly threatened and/or unique ecosystems; and/or
- areas associated with key evolutionary process.

Terrestrial habitats present in the terrestrial LSA were mapped based on the satellite imagery, literature review and site visit observations in the map.

3. General context

The Project is located in the terrestrial RSA corresponding to the "PA1305 - Azerbaijan Shrub Desert and Steppe" ecoregion which is considered part of the "Deserts and Xeric Scrublands Biome".

The climate of this ecoregion is characterized by long hot summer and mild short winters with average annual precipitation of 300-400 mm. Three main primary zonal landscape types/ecosystems within this region are: desert and semi-desert; arid open woodland; and steppe. In addition, there are two intra-zonal/azonal types: flood plain (riparian) forest along the rivers; and wetlands.

Qobustan area, were the project is located, is classified as moderate, warm semi-arid deserts. This area is considered one of the driest in Azerbaijan. Most precipitation falls between October and February, while drier months from July to August. There is a high precipitation variability from year to year.

The "PA1305 - Azerbaijan Shrub Desert and Steppe" ecoregion contains one of the highest numbers of endemic and endangered species in the Caucasus. Fauna diversity is especially remarkable in the ecoregion with many species characteristic of arid ecosystems, including many reptile species. The region coastal areas and wetlands are particularly important for birds during migrating and wintering periods.

The freshwater RSA, corresponds to the lower reach of the freshwater ecoregions known as ID 434 "Kura - South Caspian Drainages" (FEOW). This ecoregion is characterized by a marked variation of water levels. Spring flood during the first half of the summer are

caused mainly by melting snow and glaciers in the mountains and by rains. In the remaining part of the year the level is low and some smaller tributaries are dry for the majority of the year. In general the rivers in this ecoregion carry a large amount of suspended solid (alluvium) into the Caspian.

3.1. Flora of the territory

The LSA is situated in the semi-desert landscape type/ecosystems of the ecoregion known as "PA1305 - Azerbaijan Shrub Desert and Steppe".

The vegetation present in the LSA can be divided into the following types:

- semi-desert vegetation;
- riverine vegetation;
- wetland vegetation.

The vegetation present in the LSA area is heavily disturbed by past and present human activities, including heavy grazing and industrial development connected with oil and gas processing and infrastructures. In particular within the semi-desert vegetation many areas are characterized by exposed bare soil. The flora species indicate clay/saline soil terrain with very low organic content. This kind of soil in the arid climate present in the region is highly subject to surface erosion from wind and heavy rains.

Semi-desert vegetation is characterized by *Salsoletum* vegetation community. The main components of the semi-desert flora are the low perennial bushes wormwood and saltwort species and ephemeral species (*Salsola dendroides, Salsola ericoides, Salsola nodulosa, Suaeda microphylla, Artemisia lerchiana*) often accompanied by low-growing herbaceous forb species and grasses, including *Medicago minima*, *Medicago coerulea Poa bulbosa*, *Bromus japonicus*, *Lolium rigidum*, *Eremopyrum orientale*, *Erodium cicutarium*.

In areas were the soils salinity increases, more halophytic species like bluish saltwort (*Suaeda glauca*) and small leaved seablite (*Suaeda microphylla*) together with other salt tolerant shrub species (e.g. *Kalidium caspicum*, *Halocnemum strobilaceum*) are more frequent.

Large areas are lacking natural vegetation and present bare exposed soil. This situation is at least partially due to excessive livestock grazing and trampling that exacerbate soil erosion from rain and wind.

Riverine vegetation can be found in the vicinity of the two temporary stream branches that crosse the LSA. In the depression created by the river the quantity of flora increases and includes tamarisk or salt cedar thickets (*Tamarix meyeri), Alhagi pseudoalhagi, Juncus acutus* and *Salicornia europaea*. Where the stream forms temporary ponds of almost stagnant water some small stands of *Phragmites australis* can also be observed. The effects of trampling from livestock can be observed in this areas.

Intra-zonal wetland vegetation is found in the last 1 km from the cost, where the freshwater from the river forms a series of connected marshes before entering the Caspian Sea. These wetlands developed following construction of the Baku-Salyan Highway, adjacent railway line and the pipeline corridor between the railway line and the Sangachal Terminal. These marshes are dominated by common reeds (*Phragmites australis)* and broadleaf cattail (*Typha latifolia*). Seasonally inundated areas characterized by barred mudflats colonised by glasswort (*Salicornia europaea*) are also present.

These areas are impacted by industrial developments and infrastructures such as pipelines, roads, powerlines and water discharges that modify the hydrology of the area and pose a risk of pollution.

None of the species observed in the LSA are classified as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), according to the International Union for Conservation of Nature (IUCN) criteria.

The presence of two endemic species, Baku Calligonum (Calligonum bakuense) and Baku Astragalus (Astragalus bacuensis), was observed in the past in the Sangachal area (BP, 2002). However these species were not observed during the site visit.

No invasive alien species was noticed. Azerbaijan invasive plant species include the widely distributed common ragweed (*Ambrosia artemisiifolia*) and the buffalo bur nightshade (*Solanum rostratum*), both native to North America. In particular the former is a very competitive weed which can produce yield losses in soybeans as high as 30%, whereas the latter usually grows in waste and disturbed areas and is especially common in overgrazed pastures.

Saltwort species (Salsola sp.) in the LSA

Cammel thorn (Alhagi pseudoalhagi) in theLSA

Salt cedar (Tamarix meyeri) in the LSA

Common reeds (Phragmites australis) in theLSA

Erodium cicutarium in the LSA

Brassica napus l. in the LSA

Figure 6. Pictures of flora species found in LTA

3.2. Fauna of the territory

The semi-desert landscape type/ecosystems of this ecoregion (PA1305 - Azerbaijan Shrub Desert and Steppe) hosts species typical to arid ecosystems and it is notable for its reptile diversity. However, most of the LSA is situated in relatively homogenous clay/saline soil terrain, with very low vegetation cover that has been disturbed by anthropogenic activities.

Pockets of higher biodiversity value are expected within the riverine vegetation and wetlands with particular regards for amphibians, reptiles such as the pond turtle (Emys orbicularis) and migrating bird species. Mammal speces are also attracted by these "oasis" of vegetation.

The presence of freshwater fish species in the temporary wadi and in the wetland is considered to be unlikely. The baseline assessment focused on the following taxa:

- amphibian species;
- reptiles species;
- bird species;
- mammal species.

The presence of freshwater fish species in the temporary *wadi* and in the wetland areas of the LSA is considered to be unlikely.

Lists of terrestrial fauna species potentially present or observed within the LSA were created as a result of literature review and the site visit. The results of these studies are summarised as follows for each taxonomic group:

4 amphibian species, none of them is considered threatened at global level by IUCN;

18 reptile species, of which one is considered vulnerable (VU) at global level by IUCN: Testudo graeca

(Common tortoise);

255 bird species; 17 of the species are considered threatened at global level by IUCN, and in particular : 2 species are considered critically endangered (CR):

- Vanellus gregarius (Sociable Lapwing)
- Numenius tenuirostris (Slender-Billed

Curlew)3 species are considered endangered (EN):

- Oxyura leucocephala (White-headed Duck)
- Neophron percnopterus (Egyptian vulture)
- Falco cherrug (Saker Falcon)

12 species are also considered vulnerable (VU):

numerous migratory and congregatory species are also potentially present in the LSA;

38 mammal species, of which one is considered vulnerable (VU): Vormela peregusna (Marble Pole Cat). No endemic species were found or are expected to be present within the LSA

During the site visit, a dead individual of European pond turtle (Emys orbicularis) was identified the mudflats

near the wetland. A snake possibly Schmidt's Whip Snake (Dolichophis schmidti, LC) was also observed in an abandoned construction within the LSA. Several tracks and excrements probably belonging to red fox (Vulpes vulpes) and the European hare (Lepus europaeus) were observed. Dens of mouse are present in all entire area, especially close to the rivers banks.

The most sensitive periods for fauna species in this area are expected to be from April to August for amphibians and reptiles when breeding and incubation occurs. For birds the breeding period goes from March to August, with the spring and fall migrations occurring March to April, and August to October, respectively. Over-wintering birds inhabit the coastline in great numbers from October to March.

Dead European Pond Turtle (Emys orbicularis,NT) found on the mudflats near the wetland

A snake, possibly Schmidt's Whip Snake(Dolichophis schmidti) found in an abbondoned construction within the LSA

Tracks of red fox (Vulpes vulpes)

Mouse burrows in the area

Jackal burrows found in the project area

Jackal nests found in the project area

Figure 7. Fauna species found in LSA, their traces and photos of their burrows

3.2.1. Amphibians

Four different amphibian species are potentially present within the LSA according to literature review (Table 2). The presence of this species is strictly connected to the presence of wetland and wetland vegetation, since they depend on water at least for their reproduction.

The species potentially present are not considered threatened at according to IUCN standards. Hyla arborea is included in the Red Data Book of Azerbaijan. All four species are also included in Appendix II and Appendix III of the Bern Convention.

No endemic species were found or are expected to be present within the LSA.

3.2.2. Reptiles

Based on the literature review performed, a total of 18 reptile species are potentially present within the LSA (Table 3). Of these species Testudo graeca (Common tortoise) is the only one considered vulnerable (VU) at a global level according to the IUCN Red List. The species is also listed in the Red Data Book of Azerbaijan.

Two species of snakes (Telescopus fallax and Natrix tessellate) and the two tortoise (Emys orbicularis and Testudo graeca) potentially present are included in Appendix II of the Bern Convention, while the others are included in Appendix III.

During the site visit, a snake possibly Schmidt's Whip Snake (Dolichophis schmidti, LC) was observed in an abandoned construction withi the LSA. Colse to the wetland area a dead individual of European pond turtle (Emys orbicularis) was also identified.

No endemic species were found or are expected to be present within the LSA.

3.3.3. Birds

More than three-hundred and sixty species of bird are recorded in Azerbaijan. During migration and wintering periods, the importance of the region shoreline and wetlands is heightened due to the high number of migratory birds hosted in addition to the year-round species.

Based on the literature review performed, a total of 261 bird species are potentially present or passing within the LSA. This high number is mainly due to the importance that area has as migratory route and to the presence of many IBAs (Important bird Areas) in the zone, two of which situated in the vicinity of the Project: the "Sangachal Bay" IBA (at about 16 km from the Project) and the "Gobustan area" IBA (at about 4 km from the Project).

Seventeen of the bird species potentially present or passing in the LSA are considered threatened at global level by IUCN and in particular:

2 species are considered critically endangered (CR):

- Vanellus gregarius (Sociable Lapwing);
- Numenius tenuirostris (Slender-Billed Curlew);3 species are considered endangered (EN):
- Oxyura leucocephala (White-headed Duck)
- Neophron percnopterus (Egyptian vulture)
- Falco cherrug (Saker Falcon)

12 species are considered vulnerable (VU):

- Anser erythropus (Lesser White-fronted Goose)
- Aythya ferina (Common Pochard)
- Branta ruficollis (Red-breasted Goose)
- Marmaronetta angustirostris (Marbled Teal)
- Melanitta fusca (Velvet Scoter)
- Otis tarda (Great Bustard)
- Streptopelia turtur (European Turtle-dove)

- Pelecanus crispus (Dalmatian Pelican)
- Podiceps auritus (Slavonian Grebe)
- Clangula hyemalis (Long-tailed Duck)
- Aquila heliaca (Eastern Imperial Eagle)
- Clanga clanga (Greater Spotted Eagle)

No endemic bird species were found or are expected to be present within the LSA.

Воробей домовый – ev sərçəsi - *Passer domesticus Linnaeus*

Каменка обыкновенная - *Oenanthe oenanthe Linnaeus*

Zağça - ворона - *Corvus frugilegus*,

Adi sığırçın – скворец обыкновенный - *Sturnus vulgaris*

Adi qaranquş - Ласточка деревенская - *Hirundo rustica Linnaeus*

Göy göyərçin – сизый голуб - *Columba livia*

Kəkilli torağay – хохлатый жаворонок - *Galerida cristata*

Qulaqlı bayquş - Сова ушастая - *Asio*

Şanapipik - Удод – *upupa epops*

Çöl müşgülü – степная пустелька - *Falco naumanni*

Figure 8. Birds photographed directly on the project site

The considerable fraction of the species identified is known to have a migratory behaviour in the area, in particular a total of 202 migrant species were identified, of which 98 are potentially breeding, 70 are potentiallypresent only during migrations (passage) and 34 are

potentially wintering in the area. The congregatory species potentially present are 110, represented for the great majority by migrant water birds. Twelve of the species potentially present/passing within the LSA are also listed in the Red Data Book of Azerbaijan.

Considering especially the existence of wetland and shoreline habitats close and within the LSA, however degraded, the occurrence of migratory birds in the LSA cannot be excluded. Although the importance of this area for migratory, congregtory and threatened species is currently unknown.

The LSA is located within the main migration route through the lowland (Figure 7- broad red line). The autumn migration in Sangachal area and Absheron Peninsula starts in the second half of August and continues until mid-December, if winter conditions are sever, it might continue until mid-January. The peak migration period is November. The spring migration starts in the second half of February and finishes in April. March is the peak migration period. Spring migration fly direction is to the north, northwest or northeast.

Among the most abundant migratory species Podiceps cristatus, Cygnus olor, Netta rufina and Aythya farina can be listed. The most common birds associated with the semi-desert vegetation (which is the dominant habitat in the LSA) are Galerida cristata (crested lark), Melanocorypha calandra (calandra lark), and a number of Oenanthe spp. (wheatear species).

A number of species are considered associated with human settlements, including Passer domesticus (house sparrow), Columba livia (rock dove), Turdus merula (black bird), summer visitors Hirundo rustica (barn swallow), and Delichon urbicum (house martin). Opportunistic scavenger species are also relatively common and includes hooded crow Corvus coronae, rook Corvus fruigilegus, and choughs Pyrrhocorax pyrrhocorax.

The Carrion Crow (Corvus corone) and the wheatear (Oenanthe oenanthe) were observed in the LSA during the site visit.

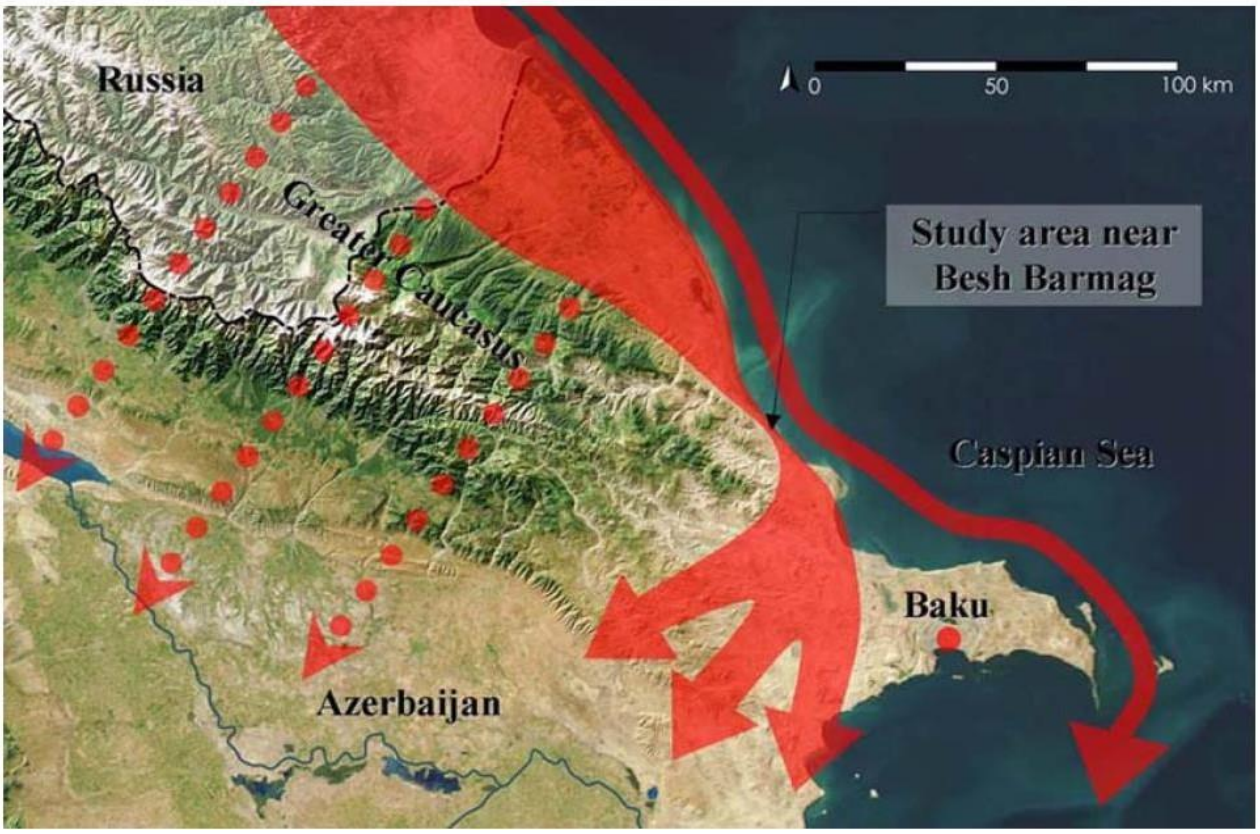

Figure 9: Important bird migration routes Autumn. Dotted red line = weak migration route through the Greater Caucasus, broad red line = main migration route through the lowland, narrow red line = coastal waterbird migration route(Source: Michael Heiss & Kai Gauger. 2011. Coastal Bird Migration at the Caspian Shore of the Azerbaijan Republic in October 2007. Podoces 2011. Vol. 6, No. 1)

3.3.4. Mammals

Based on the literature review performed and on the site visit observations, a total of 38 mammal species are potentially present within the LSA. Of these 15 species are bats (Chiroptera). The habitats present in the LSA could host only a limited number of small to medium size mammals, while for medium to large size species the use of the area is probably limited to rare occasional visits (e.g. Canis aureus, Canis lupus, Felis chaus, Meles meles, Sus scrofa).

During the site visit several tracks and excrements probably belonging to red fox (Vulpes vulpes) and the European hare (Lepus europaeus) were observed. Dens of mouse are present in all entire area, especially close to the rivers banks.

The Vormela peregusna (Marbled Polecat) is the only species potentially present considered vulnerable (VU) at a global level according to the IUCN Red List. Vormela peregusna and Miniopterus schreibersii are also listed in the Red Data Book of Azerbaijan.

No endemic species were found or are expected to be present within the LSA.

Table 2. Amphibian species potentially present within the LSA

Order	Family	Species	End.	Conservation Status		Protection Status		Obs./ Liter. data
				IUCN	Az. RDB	BERN	CITES	
Anura	Bufonidae	*Bufotes variabilis*	-	DD		-	Anura	Bufonidae
	Ranidae	*Hyla arborea*	-	LC	yes	App. II		Ranidae
		Rana macrocnemis	-	LC		App. III		
		Pelophylax ridibundus	-	LC		App. III		

Legend of the table acronyms - End. = endemic: an endemic species is defined as one that has ≥ 95 percent of its global range inside the country or region of analysis (IFC 2012. Guidance Note 6, GN79); IUCN - **CR**=Critically Endangered; **EN**=Endangered; **VU**=Vulnerable; **LR**=Lower Risk; **NT**=Near Threatened; **LC**=Least Concern; **DD**=Data Deficient; NE=not evaluated; **Az. RDB** = Red Book of Azerbaijan (2013). Bern Convention **- App.I** = Appendix-I (Strictly protected flora species); **App.II** = Appendix-II (Strictly protected fauna species); **App.III** = Appendix-III (Protected fauna species); **App.IV** = Appendix-IV (Prohibited means and methods of killing, capture and other exploitation). CITES (Convention on International Trade in Endangered Species of Wild Flora and Fauna) - **App.I** = Appendix-I (Species under the threat of extinction. Trade in the specimens of these species is not allowed except extraordinary circumstances); **App.II** = Appendix-II: (Species not threatened with extinction, but trade in specimens is restricted in order to prevent utilization incompatible with their survival); **App.III** = Appendix-III (species for which other parties of CITES applied for assistance in controlling trade and which are conserved at least in one country). **Obs./ Liter**. Data (Observed/ Litterature Data) - **L**= species identified as potentially present in the LSA through literature review; **O** = species observed in the LSA during the site visit.

Table 3: Reptiles species potentially present within the LSA

Order	Family	Species	End.	Conservation Status		Protection Status		Obs./ Liter. data
				IUCN	Az. RDB	BERN	CITES	
Squamata	Gekkonidae	*Tenuidactylus caspius*	-	LC		App. III		L
	Lacertidae	*Eremias arguta*	-	NT		App. III		L
		Eremias velox	-	NE		App. III		L
		Ophisops elegans	-	NE		App. II		L
		Phrynocephalus helioscopus	-	LC		App. III		L
	Boidae	*Eryx jaculus*	-	NE		App. III	App. II	L
	Colubridae	*Dolichophis schmidti*	-	LC		App. III		O / L
		Eirenis collaris	-	LC		App. III		L
		Eirenis modestus	-	LC		App. III		L
		Platyceps najadum	-	LC		App. III		L
		Telescopus fallax	-	LC		App. II		L
	Natricidae	*Natrix tessellata*	-	LC		App. II		L
	Psammophiidae	*Malpolon monspessulanus*	-	LC		App. III		L

Order	Family	Species	End.	Conservation Status		Protection Status		Obs./ Liter. data
				IUCN	Az. RDB	BERN	CITES	
	Scincidae	*Eumeces schneideri*	-	NE		App. III		L

	Viperidae	*Macrovipera lebetina*	-	NE		App. III		L
Testudines	Emydidae	*Emys orbicularis*	-	Lr/NT		App. II		O
	Emydidae	*Mauremys caspica*	-	NE		-	-	L
	Testudinidae	*Testudo graeca*	-	VU	yes	App. II	App II	L

A list of potential bird species present within the LSA is provided in Appendix 1 to this document.

Table 4: Mammal species potentially present within the LSA

Order		**Family**	**Species**	**End.**	**Conservation Status**		**Protection Status**		**Obs. / Liter. data**
					IUCN	**Az. RDB**	**BERN**	**CITES**	
Carnivora		Canidae	*Canis aureus*	-	LC				L
			Canis lupus	-	LC		App. II	App. II	L
			Vulpes vulpes	-	LC				L
		Felidae	*Felis chaus*	-	LC			App. II	L
		Mustelidae	*Meles meles*	-	LC		App. III		L
			Vormela peregusna	-	VU	yes	App. II		L
			Mustela nivalis	-	LC		App. III		L
Cetartiodactyla		Suidae	*Sus scrofa*	-	LC				L
Chiroptera		Miniopteridae	*Miniopterus schreibersii*	-	NT	yes	App. II		L
		Vespertilionidae	*Barbastella leucomelas*	-	LC		App. II		L

4. Habitats and ecosystems of the area

The LSA belongs to the semi-desert landscape type/ecosystems of the ecoregion known as "PA1305 - Azerbaijan Shrub Desert and Steppe". The main types of vegetation communities characteristic and naturally occurring in this landscape type/ecosystems are listed below (Map of Natural Vegetation of Europe, 2000):

- wormwood deserts (Artemisia lerchiana) with ephemeroids (Poa bulbosa, Catabrosella humilis, etc.);
- Salsola nodulosa- and S. ericoides-deserts;
- halophytic Salsola denroides-deserts (both with ephemeroids and Artemisia lerchiana); and
- halophytic wormwood deserts (Artemisia szowitziana) with therophytes, such as Petrosimonia, *Climacopters, Salicornia*, *Gamanthus* species

The LSA is included in the lower reach of the freshwater ecoregions known as ID 434 "Kura - South Caspian Drainages" and it is part of the Absheron-Gobustan hydrogeologic district, characterized by a regional surface flow being less than 0.5 l/sec/km^2. This seasonal reaves are also known as wadi. The nearest main river is the Djeyrankechmez River, which enters the

Caspian in the south eastern part of the LSA. The water flow in this river is seasonal, occurring only after heavy rain.

The semi-natural habitat present in the LSA are for the most part degraded by human activities such as overgrazing, off road driving, infrastructure development (pipelines, roads, and powerlines). Part of the area has also been used for military training.

Most of the semi-natural vegetation is characterized by semi desert vegetation. This habitat occupies 85% of the LSA and it is heavily degraded in most of the area. The semi-desert climatic condition make the habitat is extremely prone to erosion and recover with extreme difficulties and only after long periods of time from the disturbance of vegetation cover.

Scattered vegetation and atmospheric precipitation provide for intensive weathering that can lead to the formation of badlands clay karsts that can be observed within and around the LSA. The area is characterized by heavily dissected landscape with steep sided gullies.

The main vegetation community recognized is the Salsoletum dominated by saltwort species (Salsola dendroides, Salsola ericoides, Salsola nodulosa, Suaeda microphylla). These species are often accompanied by low-growing herbaceous forb species and grasses, including Medicago minima, Medicago coerulea, Poa bulbosa, Bromus japonicus, Lolium rigidum, Eremopyrum orientale, Erodium cicutarium.

Within the LSA only ephemeral surface streams, also called wadi are present. The riverine vegetation surrounding these seasonal streams (3% of the LSA) has usually higher vegetation cover and biomass, however, he effects of trampling from livestock can be observed in this areas. In the depression created by the river the quantity of flora increases and includes tamarisk or salt cedar thickets (Tamarix meyeri), Alhagi pseudoalhagi, Juncus acutus and Salicornia europaea.

This streams and channels fed the coastal wetland areas during winter months forming an internal delta and may carry substantial volumes of water following intense rainfall events. Wetlands cover about 3 % of the LSA. This wetland areas are quite modified by anthropogenic activities performed in the area and in particular by the presence of linear infrastructures that changes the local water flow and pose pollution risks. However, some reed beds still exist in the coastal areas. In these areas the species characteristic of this vegetation community are Phragmites australis or Typha latifolia.

The presence of wetland, however heavily modified, represent the only a potential attraction for fauna and in particular for migrating and wintering bird species.

Figure 10: Semi-desert (Salsoletum) vegetation dominated by woody saline species within the LSA

Figure 11: Seasonal pond among semi-desert plants

4.1. Protected and internationally recognised areas

Protected areas and internationally recognized areas within 20 km from the LSA are presented below with their main characteristics.

The nearest protected areas and their relative distance from the project site is Gobustan National Park: located at more than 6 km west linear distance from the site;

In addition, two Important Bird Areas (IBAs) are located quite close to the project area. These IBAs are:

- Gobustan area: Located 3 km northeast;
- Sangachal Bay: Located approximately 17 km east of the project area;
- Sahil settlement - Shelf factory: 39 km to the east;
- The main characteristics of the protected and internationally recognized areas identified within 50 km from theLSA are described below.

Gobustan National Park

The National Park was established in 1966 mainly as an archaeological site due to its incredible number of rock engravings. The site is also characterized by caves, settlements and burials use by the inhabitants of thearea from the Upper Paleolithic to the Middle Ages. From 2007 Gobustan is a UNESCO World Heritage Site.

Sangachal Bay IBA

This costal IBA is characterized by sandy beaches and some small wetlands stretch along the coast, many of which are overgrown with reeds vegetation. The site is important mostly for migrating and wintering water birds. At least 20.000 diving ducks and 30.000 coots (Fulica atra) stage here every autumn. The species of birds recorded in this area in different seasons are 177, including also some species of global conservation concern such as Phalacrocorax pygmeus, Pelecanus crispus (very rare migrant), Branta ruficollis (extremely rare), Circus macrourus, Aquila clanga, A. heliaca (all raptors are rare migration visitors), Falco naumanni

(1- 2 pairs breed), Tetrax tetrax.

The main threat for this site is industrial expansion connected with oil extraction. The area also suffers from pollution from industrial activities and poaching and fishing activities. Some small wetlands were drained resulting in reduction of nesting habitat and the construction of piers caused disturbance to wintering birds

Gobustan area IBA

This inland IBA includes low semi-arid mountains, a mud volcano and Djeirankechmez river. The site is one of the most important in the country for the bird species Sitta neumayer (LC) that counts 30-40 breeding pairs. Other breeding species include: Buteo rufinus, Alectoris chukar (rare), Cercotrichas galactotes, Oenanthe pleschanka, Pyrrhocorax pyrrhocorax, Petronia petronia and Emberiza melanocephala. Falco naumanni can also be observed in the area as rare summer visitor.

The main threats to this area are connected to overgrazing (sheep and cattle grazing), disturbance from tourists and low-flying military aircraft. A quarry of limestone was also present in the past.

Sahil settlement - Shelf factory IBA

The IBA is characterized by the presence of five big artificial dams builds by the local Factory of Deepwater Drilling Oil Platforms. Although artificial, this site is very important for birds wintering and migrating along the coast. The dams forms wetlands with reed vegetation that creates an optimal habitat for wintering water birds and ensures wind protection. Over 100,000 birds are present in this area in winter and migration seasons. In particular, the following species are present in large numbers: Anas platyrhynchos, Netta rufina, Aythya ferina, Aythya fuligula, Fulica atra, etc. Bird species include also Phalacrocorax pygmeus, Pelecanus crispus and Cygnus olor.

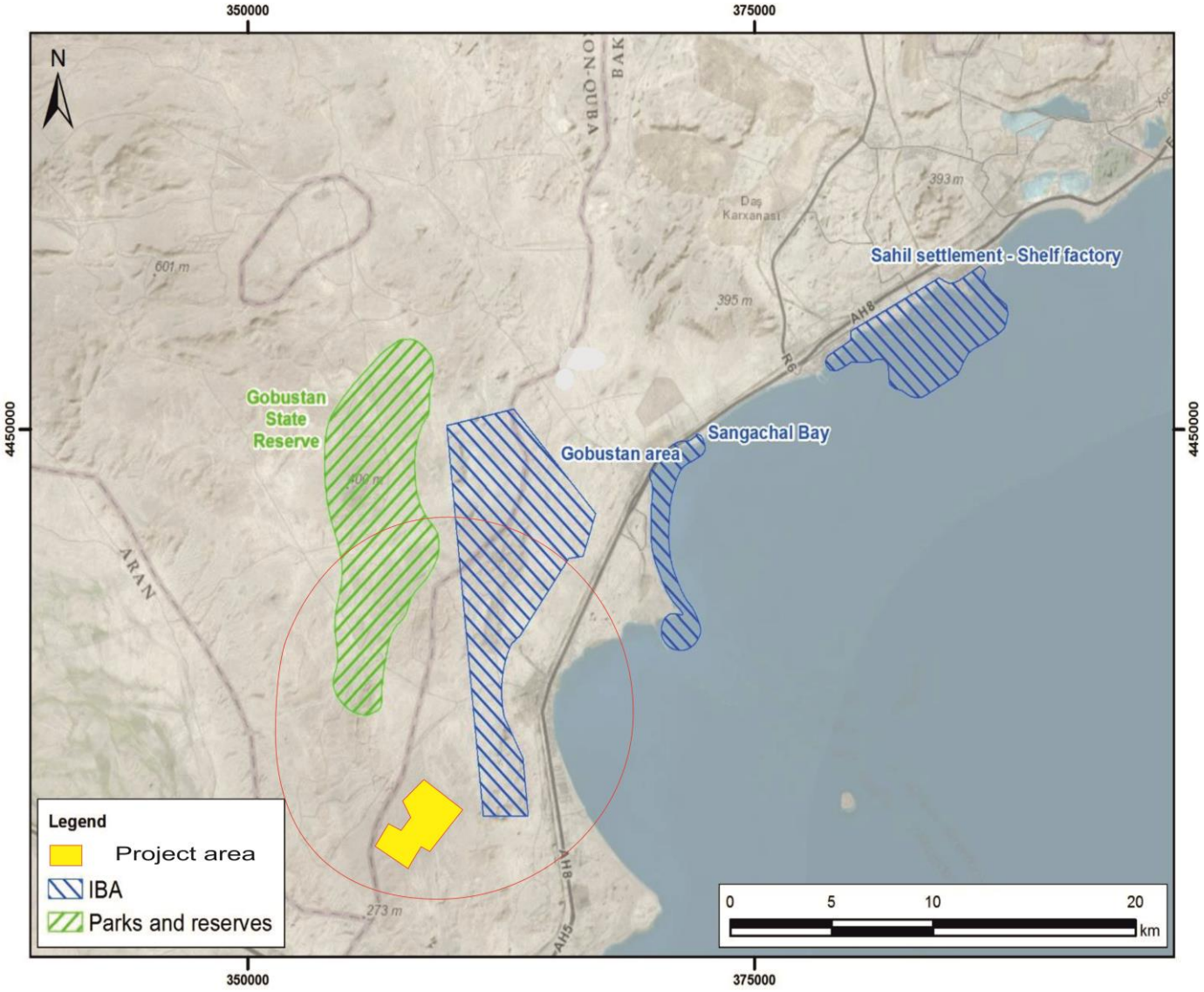

Figure 12: Protected and internationally recognized areas within 30 km from the Project

4.2. Critical Habitat Assessment

The presence of critical habitats is assessed based on the following five criteria according to PS6 (IFC 2012):

Criterion 1: Habitat of significant importance to Critically Endangered and/or Endangered species;

Five Critically Endangered and/or Endangered bird species are indicated as potentially present within theLSA, of these:

- 2 species are considered critically endangered (CR):
  - *Vanellus gregarius* (Sociable Lapwing)
  - *Numenius tenuirostris* (Slender-Billed Curlew)

- 3 species are considered endangered (EN):
  - *Oxyura leucocephala (White-headed Duck)*
  - *Neophron percnopterus (Egyptian vulture)*
  - *Falco cherrug (Saker Falcon)*

The occurrence of these Critically Endangered and/or Endangered species of birds in the onshore LSA cannotbe excluded, considering especially the presence of wetland and shoreline habitats. However it is extremely unlikely that these habitats are of importance for the conservation of the species for the following reasons:

- *the existing disturbance due to the proximity to villages, human settlements, industrial sites and transportation routes;*
- *the current level of degradation of the habitats already impacted by past anthropogenic activities (exploration and oil and gas extraction, diffuse waste dump);*
- *limited extension of wetland vegetation.*

Criterion 2: Habitat of significant importance to endemic and/or restricted-range species

No endemic and/or restricted-range species are expected to be present within the onshore LSA.

Criterion 3: Habitat supporting globally significant concentrations of migratory species and/or congregatoryspecies

The considerable fraction of the bird species potentially present is known to use the area druing migrations, in particular a total of 200 migrant species were identified. The congregatory species potentially present are 110, represented for the great majority by migrant water birds.

The occurrence of migratory and congregatory birds in the onshore LSA cannot be excluded, considering especially the presence of wetland and shoreline habitats and of the Sangachal Bay IBA. However it is unlikely that these habitats could supporting globally significant concentrations species for the following reasons:

- *the existing disturbance due to the proximity to villages, human settlements, industrial sites and transportation routes;*
- *the current level of degradation of the habitats already impacted by past anthropogenic activities (exploration and oil and gas extraction, diffuse waste dump);*
- *limited extension of wetland vegetation.*

Criterion 4: Highly threatened and/or unique ecosystems

No highly threatened or unique ecosystems have been identified within the onshore LSA.

Criterion 5: Areas associated with key evolutionary process.

No areas associated with key evolutionary process have been identified within the onshore LSA.

Based on the considerations above the presence of Critical Habitat within the project's area of influence can be reasonable excluded.

APPENDIX 1: A complete list of bird species potentially present within the LSA

Order	Family	Species	Common Name	Conservation Status		Protection Status		Obs./ Liter. data	Resident/Migrant (Breeding/ Wintering/ Passage)	Congr. species *
				IUCN	Az. RDB	BERN	CITES			
Anseriformes	Anatidae	*Anas crecca*	Common Teal	LC		App. III		L	Migrant (breeding)	A4i
Anseriformes	Anatidae	*Anas platyrhynchos*	Mallard	LC		App. III		L	Migrant (breeding)	A4i
Anseriformes	Anatidae	*Anser*	Greylag Goose	LC		App. III		L	Migrant (breeding)	A4i
Anseriformes	Anatidae	*Anser erythropus*	Lesser White-fronted Goose	VU		App. II		L	Migrant (passage)	A4i
Anseriformes	Anatidae	*Aythya ferina*	Common Pochard	VU		App. III		L	Migrant (wintering)	A4i
Anseriformes	Anatidae	*Aythya fuligula*	Tufted Duck -	LC		App. III		L	Migrant (passage)	A4i
Anseriformes	Anatidae	*Aythya marila*	Greater Scaup	LC		App. III		L	Migrant (wintering)	A4i
Anseriformes	Anatidae	*Aythya nyroca*	Ferruginous Duck	NT		App. III		L	Resident	A4i
Anseriformes	Anatidae	*Branta ruficollis*	Red-breasted Goose	VU	yes	App. II	App. III	L	Migrant (passage)	A4i
Anseriformes	Anatidae	*Bucephala clangula*	Common Goldeneye	LC		App. III		L	Migrant (wintering)	A4i
Anseriformes	Anatidae	*Clangula hyemalis*	Long-tailed Duck	VU		App. III		L	Vagrant	A4i
Anseriformes	Anatidae	*Cygnus columbianus*	Tundra Swan	LC		App. III		L	Migrant (passage)	A4i
Anseriformes	Anatidae	*Cygnus cygnus*	Whooper Swan	LC		App. II		L	Migrant (wintering)	A4i
Anseriformes	Anatidae	*Cygnus olor*	Mute Swan	LC	yes	App. III		L	Migrant (passage)	A4i
Anseriformes	Anatidae	*Mareca strepera*	Gadwall	LC		App. III		L	Migrant (breeding)	A4i
Anseriformes	Anatidae	*Marmaronetta angustirostris*	Marbled Teal	VU	yes	App. II		L	Resident	A4i
Anseriformes	Anatidae	*Melanitta fusca*	Velvet Scoter	VU		App. III		L	Migrant (passage)	A4i

Order	Family	Species	Common Name	Conservation Status		Protection Status		Obs./ Liter. data	Resident/Migrant (Breeding/ Wintering/ Passage)	Congr. species *
				IUCN	Az. RDB	BERN	CITES			
Anseriformes	Anatidae	*Mergus albellus*	Smew	LC		App. II		L	Migrant (passage)	A4i
Anseriformes	Anatidae	*Mergus merganser*	Common Merganser	LC		App. III		L	Migrant (wintering)	A4i
Anseriformes	Anatidae	*Mergus serrator*	Red-breasted Merganser	LC		App. III		L	Migrant (wintering)	A4i
Anseriformes	Anatidae	*Netta rufina*	Red-crested Pochard	LC		App. II		L	Migrant (passage)	A4i
Anseriformes	Anatidae	*Oxyura leucocephala*	White-headed Duck	EN		App. II	App. III	L	Resident	A4i
Anseriformes	Anatidae	*Spatula clypeata*	Northern Shoveler	LC		App. III		L	Migrant (breeding)	A4i
Anseriformes	Anatidae	*Spatula querquedula*	Garganey	LC		App. III		L	Migrant (breeding)	A4i
Anseriformes	Anatidae	*Tadorna ferruginea*	Ruddy Shelduck	LC		App. II		L	Migrant (breeding)	A4i
Anseriformes	Anatidae	*Tadorna tadorna*	Shelduck	LC		App. II		L	Migrant (passage)	A4i

Apodiformes	Apodidae	*Apus apus*	Common Swift	LC		App. III		L	Migrant (passage)	
Apodiformes	Apodidae	*Apus melba*	Alpine Swift	LC		App. III		L	Migrant (breeding)	
Caprimulgiformes	Caprimulgidae	*Caprimulgus europaeus*	Eurasian Nightjar	LC		App. II		L	Migrant (breeding)	
Charadriiformes	Burhinidae	*Burhinus oedicnemus*	Eurasian Thick-knee	LC		App. II		L	Migrant (breeding)	
Charadriiformes	Charadriidae	*Charadrius alexandrinus*	Kentish Plover	LC		App. II		L	Migrant (breeding)	A4i
Charadriiformes	Charadriidae	*Charadrius dubius*	Little Ringed Plover	LC		App. II		L	Migrant (breeding)	A4i
Charadriiformes	Charadriidae	*Charadrius hiaticula*	Common Ringed Plover	LC		App. II		L	Migrant (wintering)	A4i
Charadriiformes	Charadriidae	*Eudromias morinellus*	Eurasian Dotterel	LC		App. II		L	Migrant (passage)	A4i
Charadriiformes	Charadriidae	*Pluvialis squatarola*	Grey Plover	LC		App. III		L	Migrant (passage)	A4i
Charadriiformes	Charadriidae	*Vanellus gregarius*	Sociable Lapwing	CR	yes	App. III		L	Migrant (passage)	A4i
Charadriiformes	Charadriidae	*Vanellus leucurus*	White-tailed Lapwing	LC		App. III		L	Migrant (passage)	A4i
Charadriiformes	Charadriidae	*Vanellus vanellus*	Lapwing	NT		App. III		L	Migrant (breeding)	A4i
Charadriiformes	Haematopodidae	*Haematopus ostralegus*	Eurasian Oystercatcher	NT		App. III		L	Migrant (passage)	A4i
Charadriiformes	Laridae	*Chlidonias hybrida*	Whiskered Tern	LC		App. II		L	Migrant (breeding)	A4i
Charadriiformes	Laridae	*Chlidonias leucopterus*	White-winged Tern	LC		App. II		L	Migrant (breeding)	A4i
Charadriiformes	Laridae	*Chlidonias niger*	Black Tern	LC		App. II		L	Migrant (breeding)	A4i
Charadriiformes	Laridae	*Gelochelidon nilotica*	Gull-billed Tern	LC		App. II		L	Migrant (breeding)	A4i
Charadriiformes	Laridae	*Hydrocoloeus minutus*	Little Gull	LC		App. III		L	Migrant (wintering)	A4i
Charadriiformes	Laridae	*Hydroprogne caspia*	Caspian Tern	LC		App. II		L	Migrant (passage)	A4i

Order	***Family***	***Species***	***Common Name***	***Conservation Status***		***Protection Status***		***Obs./ Liter. data***	***Resident/Migrant (Breeding/ Wintering/ Passage)***	***Congr. species ****
				IUCN	***Az. RDB***	***BERN***	***CITES***			
Charadriiformes	Laridae	*Larus cachinnans*	Yellow-legged Gull	LC		App. III		L	Migrant (wintering)	A4i
Charadriiformes	Laridae	*Larus canus*	Mew Gull	LC		App. III		L	Migrant (passage)	A4i
Charadriiformes	Laridae	*Larus genei*	Slender-billed Gull	LC		App. II		L	Resident	A4i
Charadriiformes	Laridae	*Larus ichthyaetus-*	Gull	LC		App. III		L	Migrant (wintering)	A4i
Charadriiformes	Laridae	*Larus ridibundus*	Black-headed Gull	LC		App. III		L	Resident	A4i
Charadriiformes	Laridae	*Sterna hirundo*	Common Tern	LC		App. II		L	Migrant (breeding)	A4i
Charadriiformes	Laridae	*Sterna sandvicensis*	Sandwich Tern	LC		App. II		L	Migrant (wintering)	A4i
Charadriiformes	Laridae	*Sternula albifrons*	Little Tern	LC		App. II		L	Migrant (breeding)	A4i
Charadriiformes	Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt	LC		App. II		L	Migrant (breeding)	A4i
Charadriiformes	Recurvirostridae	*Recurvirostra avosetta*	Pied Avocet	LC		App. II		L	Migrant (passage)	A4i
Charadriiformes	Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	LC		App. III		L	Migrant (breeding)	A4i
Charadriiformes	Scolopacidae	*Arenaria interpres*	Ruddy Turnstone	LC		App. III		L	Migrant (passage)	A4i
Charadriiformes	Scolopacidae	*Calidris alba*	Sanderling	LC		App. II		L	Migrant (passage)	A4i
Charadriiformes	Scolopacidae	*Calidris alpina*	Dunlin	LC		App. II		L	Migrant (passage)	A4i
Charadriiformes	Scolopacidae	*Calidris falcinellus*	Broad-billed Sandpiper	LC		App. III		L	Migrant (passage)	A4i
Charadriiformes	Scolopacidae	*Calidris ferruginea*	Curlew Sandpiper	NT		App. II		L	Migrant (passage)	A4i

Charadriiformes	Scolopacidae	*Calidris minuta*	Little Stint	LC		App. II		L	Migrant (passage)	A4i
Charadriiformes	Scolopacidae	*Calidris temminckii*	Temminck's Stint	LC		App. II		L	Migrant (passage)	A4i
Charadriiformes	Scolopacidae	*Gallinago gallinago*	Common Snipe	LC		App. III		L	Migrant (passage)	A4i
Charadriiformes	Scolopacidae	*Gallinago media*	Great Snipe	NT		App. II		L	Migrant (passage)	A4i
Charadriiformes	Scolopacidae	*Limosa lapponica*	Bar-tailed Godwit	LC		App. III		L	Migrant (passage)	A4i
Charadriiformes	Scolopacidae	*Limosa limosa*	Black-tailed Godwit	NT		App. III		L	Migrant (passage)	A4i
Charadriiformes	Scolopacidae	*Lymnocryptes minimus*		LC		App. III		L	Migrant (passage)	A4i
Charadriiformes	Scolopacidae	*Numenius arquata*	Eurasian Curlew	NT		App. III		L	Migrant (passage)	A4i
Charadriiformes	Scolopacidae	*Numenius phaeopus*	Whimbrel	LC		App. III		L	Migrant (passage)	A4i
Charadriiformes	Scolopacidae	*Numenius tenuirostris*	Slender-Billed Curlew	CR		App. II	App. I	L	Vagrant	A4i
Charadriiformes	Scolopacidae	*Phalaropus fulicarius*	Red Phalarope	LC		App. III		L	Migrant (passage)	A4i
Charadriiformes	Scolopacidae	*Phalaropus lobatus*	Red-necked Phalarope	LC		App. III		L	Migrant (passage)	A4i

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Charadriiformes	Scolopacidae	*Philomachus pugnax*	Ruff-Reeve	LC		App. III		L	Migrant (passage)	A4i
Charadriiformes	Scolopacidae	*Scolopax rusticola*	Eurasian Woodcock	LC		App. III		L	Migrant (breeding)	A4i
Charadriiformes	Scolopacidae	*Tringa erythropus*	Spotted Redshank	LC		App. III		L	Migrant (passage)	A4i
Charadriiformes	Scolopacidae	*Tringa glareola*	Wood Sandpiper	LC		App. II		L	Migrant (passage)	A4i
Charadriiformes	Scolopacidae	*Tringa nebularia*	Common Greenshank	LC		App. III		L	Migrant (passage)	A4i
Charadriiformes	Scolopacidae	*Tringa ochropus*	Green Sandpiper	LC		App. II		L	Migrant (passage)	A4i
Charadriiformes	Scolopacidae	*Tringa stagnatilis*	Marsh Sandpiper	LC		App. II		L	Migrant (passage)	A4i
Charadriiformes	Scolopacidae	*Tringa totanus*	Common Redshank	LC		App. III		L	Migrant (breeding)	A4i
Charadriiformes	Scolopacidae	*Xenus cinereus*	Terek Sandpiper	LC		App. III		L	Migrant (passage)	A4i
Charadriiformes	Stercorariidae	*Stercorarius parasiticus*	Parasitic Jaeger	LC		App. III		L	Migrant (passage)	
Charadriiformes	Stercorariidae	*Stercorarius pomarinus*	Pomarine Jaeger	LC		App. III		L	Migrant (passage)	
Ciconiiformes	Ardeidae	*Ardea alba*	Great Egret	LC		App. III		L	Migrant (wintering)	A4i
Ciconiiformes	Ardeidae	*Ardea cinerea*	Grey Heron	LC		App. III		L	Resident	A4i
Ciconiiformes	Ardeidae	*Ardea purpurea*	Purple Heron	LC		App. II		L	Migrant (breeding)	A4i
Ciconiiformes	Ardeidae	*Ardeola ralloides*	Squacco Heron	LC		App. II		L	Migrant (breeding)	A4i
Ciconiiformes	Ardeidae	*Botaurus stellaris*	Great Bittern	LC		App. II		L	Migrant (breeding)	A4i
Ciconiiformes	Ardeidae	*Bubulcus ibis*	Cattle Egret	LC		App. II		L	Migrant (breeding)	A4i
Ciconiiformes	Ardeidae	*Egretta garzetta*	Little Egret	LC		App. II		L	Migrant (wintering)	A4i
Ciconiiformes	Ardeidae	*Ixobrychus minutus*	Little Bittern	LC		App. III		L	Migrant (breeding)	A4i
Ciconiiformes	Ardeidae	*Nycticorax*	Black-crowned Night Heron	LC		App. II		L	Migrant (breeding)	A4i
Ciconiiformes	Threskiornithidae	*Plegadis falcinellus*	Glossy Ibisa	LC		App. II		L	Migrant (breeding)	A4i
Columbiformes	Columbidae	*Columba livia*	Rock Pigeon	LC		App. III		L	Resident	

Columbiformes	Columbidae	*Columba oenas*	Stock Dove	LC		App. III		L	Migrant (breeding)	
Columbiformes	Columbidae	*Columba palumbus*	Common Wood Pigeon	LC				L	Migrant (breeding)	
Columbiformes	Columbidae	*Streptopelia decaocto*	Eurasian Collared Dove	LC		App. III		L	Resident	
Columbiformes	Columbidae	*Streptopelia turtur*	European Turtle-dove	VU		App. III		L	Migrant (breeding)	
Columbiformes	Pteroclididae	*Pterocles orientalis*	Black-bellied Sandgrouse	LC		App. II		L	Resident	

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Coraciiformes	Alcedinidae	*Alcedo atthis*	Common Kingfisher	LC		App. II		L	Migrant (breeding)	
Coraciiformes	Coracidae	*Coracias garrulus*	European Roller	NT		App. II		L	Migrant (breeding)	
Coraciiformes	Meropidae	*Merops apiaster*	European Bee-eater	LC		App. III		L	Migrant (breeding)	A4ii
Coraciiformes	Meropidae	*Merops persicus*	Blue-cheeked Bee-eater	LC		App. III		L	Migrant (breeding)	
Coraciiformes	Upupidae	*Upupa epops*	Eurasian Hoopoe	LC		App. II		L	Migrant (breeding)	
Cuculiformes	Cuculidae	*Cuculus canorus*	Common Cuckoo	LC		App. III		L	Migrant (breeding)	
Falconiformes	Accipitridae	*Accipiter gentilis*	Northern Goshawk	LC		App. II		L	Resident	
Falconiformes	Accipitridae	*Accipiter nisus*	Eurasian Sparrowhawk	LC		App. II		L	Migrant (breeding)	
Falconiformes	Accipitridae	*Aquila chrysaetos*	Golden Eagle	LC	yes	App. II		L	Resident	
Falconiformes	Accipitridae	*Aquila heliaca*	Eastern Imperial Eagle	VU		App. II	App. I	L	Migrant (wintering)	
Falconiformes	Accipitridae	*Buteo buteo*	Buzzard	LC		App. II		L	Migrant (breeding)	
Falconiformes	Accipitridae	*Buteo rufinus*	Long-legged Buzzard	LC		App. II		L	Migrant (breeding)	
Falconiformes	Accipitridae	*Circaetus gallicus*	Short-toed SnakeEagle	LC		App. II		L	Migrant (wintering)	
Falconiformes	Accipitridae	*Circus aeruginosus*	Western Marsh-harrier	LC		App. II		L	Migrant (breeding)	A4ii
Falconiformes	Accipitridae	*Circus cyaneus*	Northern Harrier	LC		App. II		L	Migrant (wintering)	
Falconiformes	Accipitridae	*Circus macrourus*	Pallid Harrier	NT	yes	App. II		L	Migrant (passage)	
Falconiformes	Accipitridae	*Circus pygargus*	Montagu's Harrier	LC		App. II		L	Migrant (passage)	
Falconiformes	Accipitridae	*Clanga clanga*	Greater Spotted Eagle	VU		App. II		L	Migrant (wintering)	
Falconiformes	Accipitridae	*Haliaeetus albicilla*	White-tailed Eagle	LC		App. II	App. I	L	Migrant (wintering)	
Falconiformes	Accipitridae	*Hieraaetus pennatus*	Booted Eagle	LC		App. II		L	Migrant (breeding)	A4ii
Falconiformes	Accipitridae	*Milvus migrans-*	Kite	LC		App. II		L	Migrant (breeding)	A4ii
Falconiformes	Accipitridae	*Neophron percnopterus*	Egyptian vulture	EN		App. II		L	Migrant (breeding)	
Falconiformes	Accipitridae	*Pandion haliaetus*	Osprey	LC		App. II		L	Migrant (passage)	
Falconiformes	Accipitridae	*Pernis apivorus*	European Honey-buzzard	LC		App. II		L	Migrant (breeding)	
Falconiformes	Falconidae	*Falco cherrug*	Saker Falcon	EN	yes	App. II		L	Migrant (wintering)	A4ii
Falconiformes	Falconidae	*Falco columbarius*		LC		App. II		L	Migrant (wintering)	
Falconiformes	Falconidae	*Falco naumanni*	Lesser Kestrel	LC		App. II		L	Migrant (breeding)	A4ii
Falconiformes	Falconidae	*Falco peregrinus*	Peregrine Falcon	LC	yes	App. II	App. I	L	Migrant (wintering)	

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Falconiformes	Falconidae	*Falco subbuteo*	Eurasian Hobby	LC		App. II		L	Migrant (breeding)	
Falconiformes	Falconidae	*Falco tinnunculus*	Common Kestrel	LC		App. II		L	Resident	
Galliformes	Phasianidae	*Alectoris chukar*	Chukar	LC		App. III		L	Resident	
Galliformes	Phasianidae	*Coturnix coturnix*	Common Quail	LC		App. III		L	Migrant (breeding)	
Galliformes	Phasianidae	*Perdix perdix*	Grey Partridge	LC		App. III		L	Resident	
Galliformes	Phasianidae	*Phasianus colchicus*	Common Pheasant	LC	yes	App. III		L	Resident	
Gaviiformes	Gaviidae	*Gavia arctica*	Black-throated Diver	LC		App. II		L	Migrant (wintering)	A4i
Gaviiformes	Gaviidae	*Gavia stellata*	Red-throated Diver	LC		App. II		L	Migrant (wintering)	A4i
Gruiformes	Otididae	*Otis tarda*	Great Bustard	VU	yes	App. II	App. II	L	Migrant (passage)	
Gruiformes	Otididae	*Tetrax tetrax*	Little Bustard	NT	yes	App. II	App. II	L	Migrant (wintering)	
Gruiformes	Rallidae	*Crex crex*	Corncrake	LC		App. II		L	Migrant (breeding)	
Gruiformes	Rallidae	*Fulica atra*	Common Coot	LC		App. II		L	Migrant (breeding)	A4i
Gruiformes	Rallidae	*Gallinula chloropus*	Common Moorhen	LC		App. III		L	Migrant (breeding)	A4i
Gruiformes	Rallidae	*Porphyrio porphyrio*	Purple Swamphen	LC	yes	App. III		L	Resident	
Gruiformes	Rallidae	*Porphyrio porphyrio*	Purple Swamphen	LC		App. II		L	Resident	
Gruiformes	Rallidae	*Porzana porzana*	Spotted Crake	LC		App. II		L	Migrant (breeding)	
Gruiformes	Rallidae	*Zaporina pusilla*	Baillon's Crake	LC		App. III		L	Migrant (passage)	
Passeriformes	Alaudidae	*Alauda arvensis*	Eurasian Skylark	LC		App. III		L	Migrant (breeding)	
Passeriformes	Alaudidae	*Alaudala rufescens*	Lesser Short-toed Lark	LC		App. III		L	Resident	
Passeriformes	Alaudidae	*Calandrella brachydactyla*	Greater Short-toed Lark	LC		App. II		L	Migrant (breeding)	
Passeriformes	Alaudidae	*Eremophila alpestris*	Horned Lark	LC		App. II		L	Resident	
Passeriformes	Alaudidae	*Galerida cristata*	Crested Lark	LC		App. III		L	Resident	
Passeriformes	Alaudidae	*Melanocorypha calandra*	Calandra Lark	LC		App. II		L	Resident	
Passeriformes	Bombycillidae	*Bombycilla garrulus*	Bohemian Waxwing	LC		App. II		L	Migrant (wintering)	
Passeriformes	Certhiidae	*Certhia familiaris*	Eurasian Treecreeper	LC		App. II		L	Resident	
Passeriformes	Corvidae	*Corvus corax*	Raven	LC		App. III		L	Resident	
Passeriformes	Corvidae	*Corvus corone*	Carrion Crow	LC				O	Vagrant	

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Passeriformes	Corvidae	*Corvus frugilegus*	Rook	LC		App. III		L	Resident	
Passeriformes	Corvidae	*Corvus monedula*	Eurasian Jackdaw	LC				L	Migrant (wintering)	
Passeriformes	Corvidae	*Corvus ruficollis*	Raven	LC		App. III		L	Resident	
Passeriformes	Corvidae	*Garrulus glandarius*	Eurasian Jay	LC				L	Resident	

Passeriformes	Corvidae	*Pica pica*	Black-billed Magpie	LC				L	Resident	
Passeriformes	Corvidae	*Pyrrhocorax pyrrhocorax*	Red-billed Chough	LC		App. III		L	Resident	
Passeriformes	Emberizidae	*Calcarius lapponicus*	Lapland Bunting	LC		App. II		L	Migrant (wintering)	
Passeriformes	Emberizidae	*Emberiza calandra*	Corn Bunting	LC		App. III		L	Resident	
Passeriformes	Emberizidae	*Emberiza citrinella*	Yellowhammer	LC		App. II		L	Resident	
Passeriformes	Emberizidae	*Emberiza hortulana*	Ortolan Bunting	LC		App. III		L	Migrant (breeding)	
Passeriformes	Emberizidae	*Emberiza melanocephala*	Black-headed Bunting	LC		App. III		L	Migrant (breeding)	
Passeriformes	Emberizidae	*Emberiza schoeniclus*	Reed Bunting	LC		App. II		L	Migrant (wintering)	
Passeriformes	Fringillidae	*Carduelis carduelis*	European Goldfinch	LC		App. II		L	Migrant (passage)	
Passeriformes	Fringillidae	*Carpodacus erythrinus*	Scarlet rosefinch	LC		App. II		L	Migrant (breeding)	
Passeriformes	Fringillidae	*Chloris chloris*	European Greenfinch	LC		App. II		L	Resident	
Passeriformes	Fringillidae	*Coccothraustes coccothraustes*	Hawfinch	LC		App. II		L	Migrant (wintering)	
Passeriformes	Fringillidae	*Fringilla coelebs*		LC		App. III		L	Migrant (wintering)	
Passeriformes	Fringillidae	*Fringilla montifringilla*	Brambling	LC		App. III		L	Migrant (passage)	
Passeriformes	Fringillidae	*Linaria cannabina*	Linnet (Eurasian Linnet)	LC		App. III		L	Resident	
Passeriformes	Fringillidae	*Linaria flavirostris*	Twite	LC		App. III		L	Migrant (breeding)	
Passeriformes	Fringillidae	*Loxia curvirostra*	Red Crossbill	LC		App. II		L	Resident	
Passeriformes	Fringillidae	*Pyrrhula pyrrhula*		LC		App. III		L	Migrant (passage)	
Passeriformes	Fringillidae	*Spinus spinus*	Eurasian Siskin	LC		App. III		L	Migrant (wintering)	
Passeriformes	Hirundinidae	*Delichon urbicum*	Northern House Martin	LC		App. II		L	Migrant (breeding)	
Passeriformes	Hirundinidae	*Hirundo rustica*	Barn Swallow	LC		App. II		L	Migrant (breeding)	A4ii
Passeriformes	Hirundinidae	*Riparia riparia*	Sand Martin	LC		App. II		L	Migrant (breeding)	A4ii
Passeriformes	Laniide	*Lanius collurio*	Red-backed Shrike	LC		App. II		L	Migrant (breeding)	

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Passeriformes	Laniide	*Lanius excubitor*	Great Grey Shrike	LC		App. II		L	Migrant (wintering)	
Passeriformes	Laniide	*Lanius minor*	Lesser Grey Shrike	LC		App. II		L	Migrant (breeding)	
Passeriformes	Motacillidae	*Anthus campestris*	Tawny Pipit	LC		App. II		L	Migrant (breeding)	
Passeriformes	Motacillidae	*Anthus cervinus*	Red-throated Pipit	LC		App. II		L	Migrant (passage)	
Passeriformes	Motacillidae	*Anthus trivialis*	Tree Pipit	LC		App. II		L	Migrant (passage)	
Passeriformes	Motacillidae	*Motacilla alba*	White Wagtail	LC		App. II		L	Migrant (breeding)	
Passeriformes	Motacillidae	*Motacilla flava*	Yellow Wagtail	LC		App. II		L	Migrant (breeding)	A4iv
Passeriformes	Muscicapidae	*Cercotrichas galactotes*	Rufous-tailed Scrub-robin	LC		App. II		L	Migrant (breeding)	
Passeriformes	Muscicapidae	*Cyanecula svecica*	Bluethroat	LC		App. II		L	Migrant (breeding)	
Passeriformes	Muscicapidae	*Erithacus rubecula*	European Robin	LC		App. II		L	Resident	

Passeriformes	Muscicapidae	*Ficedula hypoleuca*	European Pied Flycatcher	LC		App. II		L	Migrant (passage)	
Passeriformes	Muscicapidae	*Ficedula parva*	Red-breasted Flycatcher	LC		App. II		L	Migrant (breeding)	
Passeriformes	Muscicapidae	*Luscinia luscinia*	Thrush Nightingale	LC		App. II		L	Migrant (passage)	
Passeriformes	Muscicapidae	*Muscicapa striata*	Spotted Flycatcher	LC		App. II		L	Migrant (breeding)	
Passeriformes	Muscicapidae	*Oenanthe hispanica*	Eastern Black-eared Wheatear	LC		App. II		L	Migrant (breeding)	
Passeriformes	Muscicapidae	*Oenanthe isabellina*	Isabelline Wheatear	LC		App. II		L	Migrant (breeding)	
Passeriformes	Muscicapidae	*Oenanthe oenanthe*	Northern Wheatear	LC		App. II		O	Migrant (breeding)	
Passeriformes	Muscicapidae	*Oenanthe pleschanka*	Pied Wheatear	LC		App. II		L	Migrant (breeding)	
Passeriformes	Muscicapidae	*Phoenicurus ochruros*	Black Redstart	LC		App. II		L	Vagrant	
Passeriformes	Muscicapidae	*Phoenicurus phoenicurus*	Common Redstart	LC		App. II		L	Migrant (breeding)	
Passeriformes	Muscicapidae	*Saxicola rubetra*	Whinchat	LC		App. II		L	Migrant (breeding)	
Passeriformes	Muscicapidae	*Saxicola torquatus*	Common Stonechat	LC		App. II		L	Migrant (breeding)	
Passeriformes	Oriolidae	*Oriolus oriolus*	Eurasian Golden Oriole	LC		App. II		L	Migrant (breeding)	
Passeriformes	Paridae	*Parus ater*	Coal Tit	LC		App. II		L	Resident	
Passeriformes	Paridae	*Parus bokharensis*	Turkestan Tit	LC		App. II		L	Vagrant	
Passeriformes	Paridae	*Parus caeruleus*	Blue Tit	LC		App. II		L	Resident	
Passeriformes	Paridae	*Parus major*	Great Tit	LC		App. II		L	Resident	

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Passeriformes	Passeridae	*Passer domesticus*	House Sparrow	LC				O	Resident	
Passeriformes	Passeridae	*Passer hispaniolensis*	Spanish Sparrow	LC		App. III		L	Vagrant	
Passeriformes	Passeridae	*Passer montanus*	Tree Sparrow	LC		App. III		L	Resident	
Passeriformes	Passeridae	*Petronia petronia*	Rock Sparrow	LC		App. III		L	Resident	
Passeriformes	Remizidae	*Remiz pendulinus*	Eurasian Penduline Tit	LC		App. III		L	Migrant (passage)	
Passeriformes	Sittidae	*Sitta neumayer*	Western Rock Nuthatch	LC		App. II		L	Resident	
Passeriformes	Sittidae	*Sitta europaea*	Wood Nuthatch	LC		App. II		L	Resident	
Passeriformes	Sturnidae	*Pastor roseus*	Rosy Starling	LC		App. III		L	Migrant (breeding)	
Passeriformes	Sturnidae	*Sturnus vulgaris*	Common Starling	LC				L	Resident	
Passeriformes	Sylviidae	*Acrocephalus arundinaceus*	Great Reed Warbler	LC		App. II		L	Migrant (breeding)	
Passeriformes	Sylviidae	*Acrocephalus dumetorum*	Blyth's Reed Warbler	LC		App. II		L	Migrant (passage)	
Passeriformes	Sylviidae	*Acrocephalus melanopogon*	Moustached Warbler	LC		App. II		L	Migrant (breeding)	
Passeriformes	Sylviidae	*Acrocephalus palustris*	Marsh Warbler	LC		App. II		L	Migrant (breeding)	
Passeriformes	Sylviidae	*Acrocephalus schoenobaenus*	Sedge Warblerĸ	LC		App. II		L	Migrant (breeding)	

Passeriformes	Sylviidae	*Acrocephalus scirpaceus*	Eurasian Reed Warbler	LC		App. II		L	Migrant (breeding)	
Passeriformes	Sylviidae	*Iduna pallidus*	Eastern Olivaceous Warbler	LC		App. II		L	Migrant (breeding)	
Passeriformes	Sylviidae	*Locustella fluviatilis*	Eurasian River Wabler	LC		App. II		L	Migrant (passage)	
Passeriformes	Sylviidae	*Locustella naevia*	Common Grasshopper Warbler	LC		App. II		L	Migrant (passage)	
Passeriformes	Sylviidae	*Phylloscopus collybita*	Common Chiffchaff	LC		App. II		L	Migrant (passage)	
Passeriformes	Sylviidae	*Phylloscopus trochiloides*	Greenish Warbler	LC		App. II		L	Migrant (passage)	
Passeriformes	Sylviidae	*Phylloscopus trochilus*	Willow Warbler	LC		App. II		L	Migrant (passage)	
Passeriformes	Sylviidae	*Sylvia atricapilla*	Blackcap	LC		App. II		L	Migrant (breeding)	
Passeriformes	Sylviidae	*Sylvia borin*	Garden Warbler	LC		App. II		L	Migrant (breeding)	
Passeriformes	Sylviidae	*Sylvia communis*	Common Whitethroat	LC		App. II		L	Migrant (breeding)	
Passeriformes	Sylviidae	*Sylvia curruca*	Lesser Whitethroat	LC		App. II		L	Migrant (breeding)	

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Strigiformes	Strigidae	*Otus scops*	Common Scops Owl	LC		App. II	App. II	L	Migrant (breeding)	
Strigiformes	Strigidae	*Strix aluco*	Tawny Owl	LC		App. II	App. II	L	Resident	

*Important Bird Area (IBA) code is given for those species that can potentially fulfil the following global site criteria for congregatory species (A4): A4i= aggregations of water birds (>1% of biogeographic population); A4ii= aggregations of sea/land birds (>1% of biogeographic population); A4iii= aggregations of more than 20,000 water birds; A4iv= species at migration 'bottleneck site' (Sklyarenko et al., 2008)

Appendix 1 - Complete list of bird species potentially present within the Study Area

Order	Family	Species	Common Name	Conservation Status		Protection Status		Obs./ Liter.	Resident/Migrant (Breeding/ Wintering/ Passage)	Congregatory Species*
				IUCN	Az. RDB	BERN	CITES			
Anseriformes	*Anatidae*	*Anas crecca*	Common Teal	LC		App. III		L	Migrant (breeding)	A4i
		Anas platyrhynchos	Mallard	LC		App. III		L	Migrant (breeding)	A4i
		Anser	Greylag Goose	LC		App. III		L	Migrant (breeding)	A4i
		Anser erythropus	Lesser White-fronted Goose	VU		App. II		L	Migrant (passage)	A4i
		Aythya ferina	Common Pochard	VU		App. III		L	Migrant (wintering)	A4i
		Aythya fuligula	Tufted Duck -	LC		App. III		L	Migrant (passage)	A4i
		Aythya marila	Greater Scaup	LC		App. III		L	Migrant (wintering)	A4i
		Aythya nyroca	Ferruginous Duck	NT		App. III		L	Resident	A4i
		Branta ruficollis	Red-breasted Goose	VU	yes	App. II	App. III	L	Migrant (passage)	A4i
		Bucephala clangula	Common Goldeneye	LC		App. III		L	Migrant (wintering)	A4i
		Clangula hyemalis	Long-tailed Duck	VU		App. III		L	Vagrant	A4i
		Cygnus columbianus	Tundra Swan	LC		App. III		L	Migrant (passage)	A4i
		Cygnus cygnus	Whooper Swan	LC		App. II		L	Migrant (wintering)	A4i
		Cygnus olor	Mute Swan	LC	yes	App. III		L	Migrant (passage)	A4i
		Mareca strepera	Gadwall	LC		App. III		L	Migrant (breeding)	A4i
		Marmaronetta angustirostris	Marbled Teal	VU	yes	App. II		L	Resident	A4i
		Melanitta fusca	Velvet Scoter	VU		App. III		L	Migrant (passage)	A4i
		Mergus albellus	Smew	LC		App. II		L	Migrant (passage)	A4i
		Mergus merganser	Common Merganser	LC		App. III		L	Migrant (wintering)	A4i
		Mergus serrator	Red-breasted Merganser	LC		App. III		L	Migrant (wintering)	A4i
		Netta rufina	Red-crested Pochard	LC		App. II		L	Migrant (passage)	A4i
		Oxyura leucocephala	White-headed Duck	EN		App. II	App. III	L	Resident	A4i
		Spatula clypeata	Northern Shoveler	LC		App. III		L	Migrant (breeding)	A4i
		Spatula querquedula	Garganey	LC		App. III		L	Migrant (breeding)	A4i
		Tadorna ferruginea	Ruddy Shelduck	LC		App. II		L	Migrant (breeding)	A4i
		Tadorna tadorna	Shelduck	LC		App. II		L	Migrant (passage)	A4i
	Apodidae	*Apus apus*	Common Swift	LC		App. III		L	Migrant (passage)	
		Apus melba	Alpine Swift	LC		App. III		L	Migrant (breeding)	
Caprimulgiformes	*Caprimulgidae*	*Caprimulgus europaeus*	Eurasian Nightjar	LC		App. II		L	Migrant (breeding)	
	Burhinidae	*Burhinus oedicnemus*	Eurasian Thick-knee	LC		App. II		L	Migrant (breeding)	
	Charadriidae	*Charadrius alexandrinus*	Kentish Plover	LC		App. II		L	Migrant (breeding)	A4i
		Charadrius dubius	Little Ringed Plover	LC		App. II		L	Migrant (breeding)	A4i
		Charadrius hiaticula	Common Ringed Plover	LC		App. II		L	Migrant (wintering)	A4i
		Eudromias morinellus	Eurasian Dotterel	LC		App. II		L	Migrant (passage)	A4i
		Pluvialis squatarola	Grey Plover	LC		App. III		L	Migrant (passage)	A4i

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				IUCN	Az. RDB	BERN	CITES			
		Vanellus gregarius	Sociable Lapwing	CR	yes	App. III		L	Migrant (passage)	A4i
		Vanellus leucurus	White-tailed Lapwing	LC		App. III		L	Migrant (passage)	A4i
		Vanellus vanellus	Lapwing	NT		App. III		L	Migrant (breeding)	A4i
	Haematopodidae	*Haematopus ostralegus*	Eurasian Oystercatcher	NT		App. III		L	Migrant (passage)	A4i
	Laridae	*Chlidonias hybrida*	Whiskered Tern	LC		App. II		L	Migrant (breeding)	A4i
		Chlidonias leucopterus	White-winged Tern	LC		App. II		L	Migrant (breeding)	A4i
		Chlidonias niger	Black Tern	LC		App. II		L	Migrant (breeding)	A4i
		Gelochelidon nilotica	Gull-billed Tern	LC		App. II		L	Migrant (breeding)	A4i
		Hydrocoloeus minutus	Little Gull	LC		App. III		L	Migrant (wintering)	A4i
		Hydroprogne caspia	Caspian Tern	LC		App. II		L	Migrant (passage)	A4i
		Larus cachinnans	Yellow-legged Gull	LC		App. III		L	Migrant (wintering)	A4i
		Larus canus	Mew Gull	LC		App. III		L	Migrant (passage)	A4i
		Larus genei	Slender-billed Gull	LC		App. II		L	Resident	A4i
		Larus ichthyaetus-	Gull	LC		App. III		L	Migrant (wintering)	A4i
		Larus ridibundus	Black-headed Gull	LC		App. III		L	Resident	A4i
		Sterna hirundo	Common Tern	LC		App. II		L	Migrant (breeding)	A4i
		Sterna sandvicensis	Sandwich Tern	LC		App. II		L	Migrant (wintering)	A4i
		Sternula albifrons	Little Tern	LC		App. II		L	Migrant (breeding)	A4i
	Recurvirostridae	*Himantopus himantopus*	Black-winged Stilt	LC		App. II		L	Migrant (breeding)	A4i
		Recurvirostra avosetta	Pied Avocet	LC		App. II		L	Migrant (passage)	A4i
	Scolopacidae	*Actitis hypoleucos*	Common Sandpiper	LC		App. III		L	Migrant (breeding)	A4i
		Arenaria interpres	Ruddy Turnstone	LC		App. III		L	Migrant (passage)	A4i
		Calidris alba	Sanderling	LC		App. II		L	Migrant (passage)	A4i
		Calidris alpina	Dunlin	LC		App. II		L	Migrant (passage)	A4i
		Calidris falcinellus	Broad-billed Sandpiper	LC		App. III		L	Migrant (passage)	A4i
		Calidris ferruginea	Curlew Sandpiper	NT		App. II		L	Migrant (passage)	A4i
		Calidris minuta	Little Stint	LC		App. II		L	Migrant (passage)	A4i
		Calidris temminckii	Temminck's Stint	LC		App. II		L	Migrant (passage)	A4i
		Gallinago gallinago	Common Snipe	LC		App. III		L	Migrant (passage)	A4i
		Gallinago media	Great Snipe	NT		App. II		L	Migrant (passage)	A4i
		Limosa lapponica	Bar-tailed Godwit	LC		App. III		L	Migrant (passage)	A4i
		Limosa limosa	Black-tailed Godwit	NT		App. III		L	Migrant (passage)	A4i
		Lymnocryptes minimus	Jake Snipe	LC		App. III		L	Migrant (passage)	A4i
		Numenius arquata	Eurasian Curlew	NT		App. III		L	Migrant (passage)	A4i
		Numenius phaeopus	Whimbrel	LC		App. III		L	Migrant (passage)	A4i

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				IUCN	Az. RDB	BERN	CITES			
		Numenius tenuirostris	Slender-Billed Curlew	CR		App. II	App. I	L	Vagrant	A4i
		Phalaropus fulicarius	Red Phalarope	LC		App. III		L	Migrant (passage)	A4i
		Phalaropus lobatus	Red-necked Phalarope	LC		App. III		L	Migrant (passage)	A4i
		Philomachus pugnax	Ruff-Reeve	LC		App. III		L	Migrant (passage)	A4i
		Scolopax rusticola	Eurasian Woodcock	LC		App. III		L	Migrant (breeding)	A4i
		Tringa erythropus	Spotted Redshank	LC		App. III		L	Migrant (passage)	A4i
		Tringa glareola	Wood Sandpiper	LC		App. II		L	Migrant (passage)	A4i
		Tringa nebularia	Common Greenshank	LC		App. III		L	Migrant (passage)	A4i
		Tringa ochropus	Green Sandpiper	LC		App. II		L	Migrant (passage)	A4i
		Tringa stagnatilis	Marsh Sandpiper	LC		App. II		L	Migrant (passage)	A4i
		Tringa totanus	Common Redshank	LC		App. III		L	Migrant (breeding)	A4i
		Xenus cinereus	Terek Sandpiper	LC		App. III		L	Migrant (passage)	A4i
	Stercorariidae	*Stercorarius parasiticus*	Parasitic Jaeger	LC		App. III		L	Migrant (passage)	
		Stercorarius pomarinus	Pomarine Jaeger	LC		App. III		L	Migrant (passage)	
Ciconiiformes	*Ardeidae*	*Ardea alba*	Great Egret	LC		App. III		L	Migrant (wintering)	A4i
		Ardea cinerea	Grey Heron	LC		App. III		L	Resident	A4i
		Ardea purpurea	Purple Heron	LC		App. II		L	Migrant (breeding)	A4i
		Ardeola ralloides	Squacco Heron	LC		App. II		L	Migrant (breeding)	A4i
		Botaurus stellaris	Great Bittern	LC		App. II		L	Migrant (breeding)	A4i
		Bubulcus ibis	Cattle Egret	LC		App. II		L	Migrant (breeding)	A4i
		Egretta garzetta	Little Egret	LC		App. II		L	Migrant (wintering)	A4i
		Ixobrychus minutus	Little Bittern	LC		App. III		L	Migrant (breeding)	A4i
		Nycticorax	Black-crowned Night Heron	LC		App. II		L	Migrant (breeding)	A4i
	Threskiornithidae	*Plegadis falcinellus*	Glossy Ibisa	LC		App. II		L	Migrant (breeding)	A4i
Columbiformes	*Columbidae*	*Columba livia*	Rock Pigeon	LC		App. III		L	Resident	
		Columba oenas	Stock Dove	LC		App. III		L	Migrant (breeding)	
		Columba palumbus	Common Wood Pigeon	LC				L	Migrant (breeding)	
		Streptopelia decaocto	Eurasian Collared Dove	LC		App. III		L	Resident	
		Streptopelia turtur	European Turtle-dove	VU		App. III		L	Migrant (breeding)	
	Pteroclididae	*Pterocles orientalis*	Black-bellied Sandgrouse	LC		App. II		L	Resident	
Coraciiformes	*Alcedinidae*	*Alcedo atthis*	Common Kingfisher	LC		App. II		L	Migrant (breeding)	
	Coracidae	*Coracias garrulus*	European Roller	NT		App. II		L	Migrant (breeding)	
	Meropidae	*Merops apiaster*	European Bee-eater	LC		App. III		L	Migrant (breeding)	A4ii
		Merops persicus	Blue-cheeked Bee-eater	LC		App. III		L	Migrant (breeding)	

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				IUCN	Az. RDB	BERN	CITES			
	Upupidae	*Upupa epops*	Eurasian Hoopoe	LC		App. II		L	Migrant (breeding)	
Cuculiformes	*Cuculidae*	*Cuculus canorus*	Common Cuckoo	LC		App. III		L	Migrant (breeding)	
Falconiformes	*Accipitridae*	*Accipiter gentilis*	Northern Goshawk	LC		App. II		L	Resident	
		Accipiter nisus	Eurasian Sparrowhawk	LC		App. II		L	Migrant (breeding)	
		Aquila chrysaetos	Golden Eagle	LC	yes	App. II		L	Resident	
		Aquila heliaca	Eastern Imperial Eagle	VU		App. II	App. I	L	Migrant (wintering)	
		Buteo buteo	Buzzard	LC		App. II		L	Migrant (breeding)	
		Buteo rufinus	Long-legged Buzzard	LC		App. II		L	Migrant (breeding)	
		Circaetus gallicus	Short-toed SnakeEagle	LC		App. II		L	Migrant (wintering)	
		Circus aeruginosus	Western Marsh-harrier	LC		App. II		L	Migrant (breeding)	A4ii
		Circus cyaneus	Northern Harrier	LC		App. II		L	Migrant (wintering)	
		Circus macrourus	Pallid Harrier	NT	yes	App. II		L	Migrant (passage)	
		Circus pygargus	Montagu's Harrier	LC		App. II		L	Migrant (passage)	
		Clanga clanga	Greater Spotted Eagle	VU		App. II		L	Migrant (wintering)	
		Haliaeetus albicilla	White-tailed Eagle	LC		App. II	App. I	L	Migrant (wintering)	
		Hieraaetus pennatus	Booted Eagle	LC		App. II		L	Migrant (breeding)	A4ii
		Milvus migrans-	Kite	LC		App. II		L	Migrant (breeding)	A4ii
		Neophron percnopterus	Egyptian vulture	EN		App. II		L	Migrant (breeding)	
		Pandion haliaetus	Osprey	LC		App. II		L	Migrant (passage)	
		Pernis apivorus	European Honey-buzzard	LC		App. II		L	Migrant (breeding)	
	Falconidae	*Falco cherrug*	Saker Falcon	EN	yes	App. II		L	Migrant (wintering)	A4ii
		Falco columbarius	Merlin	LC		App. II		L	Migrant (wintering)	
		Falco naumanni	Lesser Kestrel	LC		App. II		L	Migrant (breeding)	A4ii
		Falco peregrinus	Peregrine Falcon	LC	yes	App. II	App. I	L	Migrant (wintering)	
		Falco subbuteo	Eurasian Hobby	LC		App. II		L	Migrant (breeding)	
		Falco tinnunculus	Common Kestrel	LC		App. II		L	Resident	
Galliformes	*Phasianidae*	*Alectoris chukar*	Chukar	LC		App. III		L	Resident	
		Coturnix coturnix	Common Quail	LC		App. III		L	Migrant (breeding)	
		Perdix perdix	Grey Partridge	LC		App. III		L	Resident	
		Phasianus colchicus	Common Pheasant	LC	yes	App. III		L	Resident	
Gaviiformes	*Gaviidae*	*Gavia arctica*	Black-throated Diver	LC		App. II		L	Migrant (wintering)	A4i
		Gavia stellata	Red-throated Diver	LC		App. II		L	Migrant (wintering)	A4i
Gruiformes	*Otididae*	*Otis tarda*	Great Bustard	VU	yes	App. II	App. II	L	Migrant (passage)	
		Tetrax tetrax	Little Bustard	NT	yes	App. II	App. II	L	Migrant (wintering)	

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				IUCN	Az. RDB	BERN	CITES			
	Rallidae	*Crex crex*	Corncrake	LC		App. II		L	Migrant (breeding)	
		Fulica atra	Common Coot	LC		App. II		L	Migrant (breeding)	A4i
		Gallinula chloropus	Common Moorhen	LC		App. III		L	Migrant (breeding)	A4i
		Porphyrio porphyrio	Purple Swamphen	LC	yes	App. III		L	Resident	
		Porphyrio porphyrio	Purple Swamphen	LC		App. II		L	Resident	
		Porzana porzana	Spotted Crake	LC		App. II		L	Migrant (breeding)	
		Zaporina pusilla	Baillon's Crake	LC		App. III		L	Migrant (passage)	
Passeriformes	*Alaudidae*	*Alauda arvensis*	Eurasian Skylark	LC		App. III		L	Migrant (breeding)	
		Alaudala rufescens	Lesser Short-toed Lark	LC		App. III		L	Resident	
		Calandrella brachydactyla	Greater Short-toed Lark	LC		App. II		L	Migrant (breeding)	
		Eremophila alpestris	Horned Lark	LC		App. II		L	Resident	
		Galerida cristata	Crested Lark	LC		App. III		L	Resident	
		Melanocorypha calandra	Calandra Lark	LC		App. II		L	Resident	
	Bombycillidae	*Bombycilla garrulus*	Bohemian Waxwing	LC		App. II		L	Migrant (wintering)	
	Certhiidae	*Certhia familiaris*	Eurasian Treecreeper	LC		App. II		L	Resident	
	Corvidae	*Corvus corax*	Raven	LC		App. III		L	Resident	
		Corvus corone	Carrion Crow	LC				O	Vagrant	
		Corvus frugilegus	Rook	LC		App. III		L	Resident	
		Corvus monedula	Eurasian Jackdaw	LC				L	Migrant (wintering)	
		Corvus ruficollis	Raven	LC		App. III		L	Resident	
		Garrulus glandarius	Eurasian Jay	LC				L	Resident	
		Pica pica	Black-billed Magpie	LC				L	Resident	
		Pyrrhocorax pyrrhocorax	Red-billed Chough	LC		App. III		L	Resident	
	Emberizidae	*Calcarius lapponicus*	Lapland Bunting	LC		App. II		L	Migrant (wintering)	
		Emberiza calandra	Corn Bunting	LC		App. III		L	Resident	
		Emberiza citrinella	Yellowhammer	LC		App. II		L	Resident	
		Emberiza hortulana	Ortolan Bunting	LC		App. III		L	Migrant (breeding)	
		Emberiza melanocephala	Black-headed Bunting	LC		App. III		L	Migrant (breeding)	
		Emberiza schoeniclus	Reed Bunting	LC		App. II		L	Migrant (wintering)	
	Fringillidae	*Carduelis carduelis*	European Goldfinch	LC		App. II		L	Migrant (passage)	
		Carpodacus erythrinus	Scarlet rosefinch	LC		App. II		L	Migrant (breeding)	
		Chloris chloris	European Greenfinch	LC		App. II		L	Resident	
		Coccothraustes coccothraustes	Hawfinch	LC		App. II		L	Migrant (wintering)	
		Fringilla coelebs	Common Chaffinch	LC		App. III		L	Migrant (wintering)	
		Fringilla montifringilla	Brambling	LC		App. III		L	Migrant (passage)	

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				IUCN	Az. RDB	BERN	CITES			
		Linaria cannabina	Linnet (Eurasian Linnet)	LC		App. III		L	Resident	
		Linaria flavirostris	Twite	LC		App. III		L	Migrant (breeding)	
		Loxia curvirostra	Red Crossbill	LC		App. II		L	Resident	
		Pyrrhula pyrrhula	Eurasian Bullfinch	LC		App. III		L	Migrant (passage)	
		Spinus spinus	Eurasian Siskin	LC		App. III		L	Migrant (wintering)	
	Hirundinidae	*Delichon urbicum*	Northern House Martin	LC		App. II		L	Migrant (breeding)	
		Hirundo rustica	Barn Swallow	LC		App. II		L	Migrant (breeding)	A4ii
		Riparia riparia	Sand Martin	LC		App. II		L	Migrant (breeding)	A4ii
	Laniide	*Lanius collurio*	Red-backed Shrike	LC		App. II		L	Migrant (breeding)	
		Lanius excubitor	Great Grey Shrike	LC		App. II		L	Migrant (wintering)	
		Lanius minor	Lesser Grey Shrike	LC		App. II		L	Migrant (breeding)	
	Motacillidae	*Anthus campestris*	Tawny Pipit	LC		App. II		L	Migrant (breeding)	
		Anthus cervinus	Red-throated Pipit	LC		App. II		L	Migrant (passage)	
		Anthus trivialis	Tree Pipit	LC		App. II		L	Migrant (passage)	
		Motacilla alba	White Wagtail	LC		App. II		L	Migrant (breeding)	
		Motacilla flava	Yellow Wagtail	LC		App. II		L	Migrant (breeding)	A4iv
	Muscicapidae	*Cercotrichas galactotes*	Rufous-tailed Scrub-robin	LC		App. II		L	Migrant (breeding)	
		Cyanecula svecica	Bluethroat	LC		App. II		L	Migrant (breeding)	
		Erithacus rubecula	European Robin	LC		App. II		L	Resident	
		Ficedula hypoleuca	European Pied Flycatcher	LC		App. II		L	Migrant (passage)	
		Ficedula parva	Red-breasted Flycatcher	LC		App. II		L	Migrant (breeding)	
		Luscinia luscinia	Thrush Nightingale	LC		App. II		L	Migrant (passage)	
		Muscicapa striata	Spotted Flycatcher	LC		App. II		L	Migrant (breeding)	
		Oenanthe hispanica	Eastern Black-eared Wheatear	LC		App. II		L	Migrant (breeding)	
		Oenanthe isabellina	Isabelline Wheatear	LC		App. II		L	Migrant (breeding)	
		Oenanthe oenanthe	Northern Wheatear	LC		App. II		O	Migrant (breeding)	
		Oenanthe pleschanka	Pied Wheatear	LC		App. II		L	Migrant (breeding)	
		Phoenicurus ochruros	Black Redstart	LC		App. II		L	Vagrant	
		Phoenicurus phoenicurus	Common Redstart	LC		App. II		L	Migrant (breeding)	
		Saxicola rubetra	Whinchat	LC		App. II		L	Migrant (breeding)	
		Saxicola torquatus	Common Stonechat	LC		App. II		L	Migrant (breeding)	
	Oriolidae	*Oriolus oriolus*	Eurasian Golden Oriole	LC		App. II		L	Migrant (breeding)	
	Paridae	*Parus ater*	Coal Tit	LC		App. II		L	Resident	
		Parus bokharensis	Turkestan Tit	LC		App. II		L	Vagrant	
		Parus caeruleus	Blue Tit	LC		App. II		L	Resident	

Appendix 1 - Complete list of bird species potentially present within the Study Area

Order	Family	Species	Common Name	Conservation Status		Protection Status		Obs./ Liter.	Resident/Migrant (Breeding/ Wintering/ Passage)	Congregatory Species*
				IUCN	Az. RDB	BERN	CITES			
		Parus major	Great Tit	LC		App. II		L	Resident	
	Passeridae	*Passer domesticus*	House Sparrow	LC				O	Resident	
		Passer hispaniolensis	Spanish Sparrow	LC		App. III		L	Vagrant	
		Passer montanus	Tree Sparrow	LC		App. III		L	Resident	
		Petronia petronia	Rock Sparrow	LC		App. III		L	Resident	
	Remizidae	*Remiz pendulinus*	Eurasian Penduline Tit	LC		App. III		L	Migrant (passage)	
	Sittidae	*Sitta neumayer*	Western Rock Nuthatch	LC		App. II		L	Resident	
		Sitta europaea	Wood Nuthatch	LC		App. II		L	Resident	
	Sturnidae	*Pastor roseus*	Rosy Starling	LC		App. III		L	Migrant (breeding)	
		Sturnus vulgaris	Common Starling	LC				L	Resident	
	Sylviidae	*Acrocephalus arundinaceus*	Great Reed Warbler	LC		App. II		L	Migrant (breeding)	
		Acrocephalus dumetorum	Blyth's Reed Warbler	LC		App. II		L	Migrant (passage)	
		Acrocephalus melanopogon	Moustached Warbler	LC		App. II		L	Migrant (breeding)	
		Acrocephalus palustris	Marsh Warbler	LC		App. II		L	Migrant (breeding)	
		Acrocephalus schoenobaenus	Sedge Warblerĸ	LC		App. II		L	Migrant (breeding)	
		Acrocephalus scirpaceus	Eurasian Reed Warbler	LC		App. II		L	Migrant (breeding)	
		Iduna pallidus	Eastern Olivaceous Warbler	LC		App. II		L	Migrant (breeding)	
		Locustella fluviatilis	Eurasian River Wabler	LC		App. II		L	Migrant (passage)	
		Locustella naevia	Common Grasshopper Warbler	LC		App. II		L	Migrant (passage)	
		Phylloscopus collybita	Common Chiffchaff	LC		App. II		L	Migrant (passage)	
		Phylloscopus trochiloides	Greenish Warbler	LC		App. II		L	Migrant (passage)	
		Phylloscopus trochilus	Willow Warbler	LC		App. II		L	Migrant (passage)	
		Sylvia atricapilla	Blackcap	LC		App. II		L	Migrant (breeding)	
		Sylvia borin	Garden Warbler	LC		App. II		L	Migrant (breeding)	
		Sylvia communis	Common Whitethroat	LC		App. II		L	Migrant (breeding)	
		Sylvia curruca	Lesser Whitethroat	LC		App. II		L	Migrant (breeding)	
Strigiformes	*Strigidae*	*Otus scops*	Common Scops Owl	LC		App. II	App. II	L	Migrant (breeding)	
		Strix aluco	Tawny Owl	LC		App. II	App. II	L	Resident	

Notes

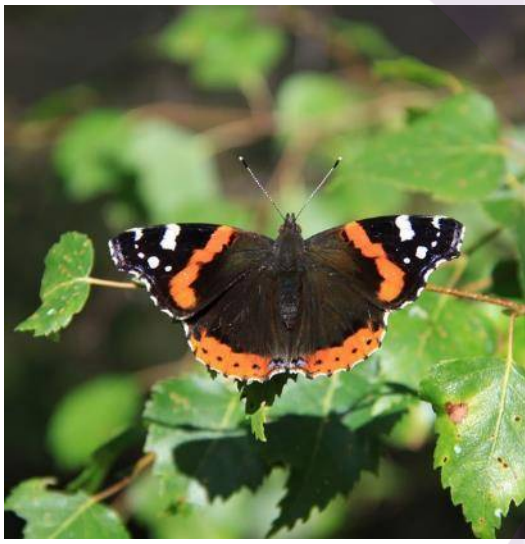
*Important Bird Area (IBA) code is given for those species that can potentially fulfil the following global site criteria for congregatory species (A4): A4i = aggregations of water birds (>1% of biogeographic population); A4ii= aggregations of sea/land birds (>1% of biogeographic population); A4iii= aggregations of more than 20,000 water birds; A4iv = species at migration 'bottleneck site' (Sklyarenko et al., 2008).

Appendix F Hydrological Report

Masdar

Area 60 Solar Hydrology Study

Baseline Hydrology and Flood Risk Appraisal



Wood Group UK Limited – March 2021

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Document revisions

No.	Details	Date
1	Hydrology Report	February 2021
2	Revision to Ch 3 following client comments	March 2021

Executive summary

Wood Group UK was appointed by Wood Clean Energy on behalf of Masdar for the provision of a hydrological study to support the development of a new solar project at Area 60, approximately 60km south-west of Baku, Azerbaijan.

A 2D catchment-wide pluvial hydraulic model has been developed in InfoWorks ICM software to characterise the baseline flood hazard at the Site. The model has been developed using a combination of local topographic survey data and various wider global and commercially available datasets.

The rainfall events applied to the hydraulic model have been generated using Extreme Value Analysis (EVA) undertaken on rainfall gauge data from Alat, and subsequent IDF curves. A critical duration analysis was undertaken to determine the storm duration which produces the greatest flood depths and discharge across the Site. The model was subsequently run with four design rainfall hyetographs.

The model results were processed to produce GIS and mapped outputs of maximum flood depth and velocity, and further tabulated at key locations across flowpaths intersecting the Site. The recorded maximum depth and velocity result across the Site should be used to form the basis of watercourse crossing and any flood resilience measures required.

Sensitivity testing of the model was carried out to quantify the impact on the results in response to variations in key parameters and assumptions made in the baseline model. These included the topographic adjustment applied to the wider topography dataset, Manning's n roughness coefficient and the rainfall runoff coefficient. The results of these tests were compared against the baseline modelling to assess the sensitivity of the model to these parameters.

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1. Introduction

1.1 Study aims and objective

The objective of this study is to undertake a hydrological assessment at a proposed Photovoltaic (PV) Power Plant in Eastern Azerbaijan, 60km south-west of Baku, referred to hereafter as the Project site. The study aims to review available data on climate, topography, geology, and hydrology, and to determine the potential flood risk to the site using a hydraulic model. The model outputs will provide the site designers with a constraints map to allow flood risk and flow paths across the site to be considered when finalising the site design.

The specific objectives of the hydrological study are defined below:

- Characterise baseline conditions for the Project site;
- Identify potential flood hazards;
- Quantify flood hazards as far as possible, based on existing datasets and hydraulic modelling of rainfall-runoff across the site; and
- Provide guidance for the future site design including a comment on requirements for watercourse crossings and flood resilience measures.

1.2 Sources of data

Sources of data and other information used to inform the study are listed in Table 1.1.

Table 1.1 Key sources of data

Data	Description	Body	Source
Site Topographical Survey	Topographical survey conducted in Area 60 of Qobustan, Azerbaijan (2020)	Azerbaijan Risk Professionals Association (ARPA)	Masdar
Geotechnical and Geological Survey	Geotechnical and geological survey conducted in Area 60 of Qobustan, Azerbaijan (2020)	Azerbaijan Risk Professionals Association (ARPA)	Masdar
Advanced Land Observing Satellite (ALOS) World 3D-30m (AW3D) Digital Surface Model (DSM)	Digital Surface Model (DSM) of 2.5m resolution for surrounding areas of the site, derived from ALOS stereo satellite imagery (2006-2011). The data has a 5m RMSE.	Japan Aerospace Exploration Agency	https://www.aw3d.jp/en/products/standard/

Data	Description	Body	Source
Soil and Terrain Database	Soil content grid to be used in calculating infiltration	International Soil Reference and Information Centre (ISRIC)	https://data.isric.org/geonetwork/srv/eng/catalog.search#/home
Land Use Cover	Global land cover map obtained 2015, using Sentinel-1 and Sentinel-2 data.	European Space Agency Climate Change Initiative (ESACC)	http://cci.esa.int/hrlandcover
Daily Rainfall Gauge Data	Daily rainfall gauge data for five nearby stations (1881-2017)	National Oceanic and Atmospheric Administration (NOAA)	https://www.ncdc.noaa.gov/
Sub-Daily Rainfall Gauge Data	3-hourly rainfall gauge data for the Alat gauge	Azerbaijan Hydrometeorological Service	Azerbaijan Hydrometeorological Service

1.3 Terminology

Annual Exceedance Probability (AEP)

In this report, the probability of a flood occurring is expressed in terms of Annual Exceedance Probability (AEP), which is the inverse of the long-term average return period. For example, the 1 in 100-year flood can be expressed as the 1 in 100 or 1% AEP flood, which has a 1 in 100 or 1% chance of being exceeded in any year.

1.4 Document structure

The report is divided into seven as summarised below:

1. Introduction - Introductory section and definition of the aims and objectives of the study;
2. Project site description - Introduces the location of the site, and provides a brief overview of the site characteristics;
3. Catchment characteristics -Provides a description of the relevant characteristics of the site and its surroundings, including geology, soils, topography, land use and hydrogeology;
4. Topography and drainage - Describes the topography of the sit, data processing, and the natural drainage networks and channels in the surrounding area;
5. Rainfall data analysis and climate - Describes the climate of Azerbaijan, characterising the rainfall and presents the extreme rainfall intensity-duration-frequency statistics for the site;
6. Flood modelling methodology and results - Provides an overview of the process undertaken in assessing flood risk on the site, including a description of the hydrological and hydraulic modelling methods applied, and presentation of the results; and
7. Conclusions and recommendations - Summarises the main points arising from the assessment, and provides recommendations for flood risk management for the Project.

2. Site description

2.1 The Project Site

The Project site occupies an area of 551 acres and can be seen in Figure 2.1. It is located within an area characterised by the presence of mud volcanoes, approximately 60 km south-west of the capital Baku and 11 km north-west of the coastal town of Alat. The site is predominantly covered by sparse herbaceous vegetation and crossed by numerous unsurfaced footpaths and tracks. There are no settlements within the site boundary, however, there are several minor unnamed settlements located to the north-west, north, and east of the Project site.

There are no perennial watercourses within the site, although satellite imagery and topographic data identifies several drainage channels in the northern portion of the site flowing in a northerly direction towards Qobustan. The most significant drainage channel originates to the south-east of the site boundary and captures run-off from the adjacent mud volcano situated 1.5 km East of the site boundary.

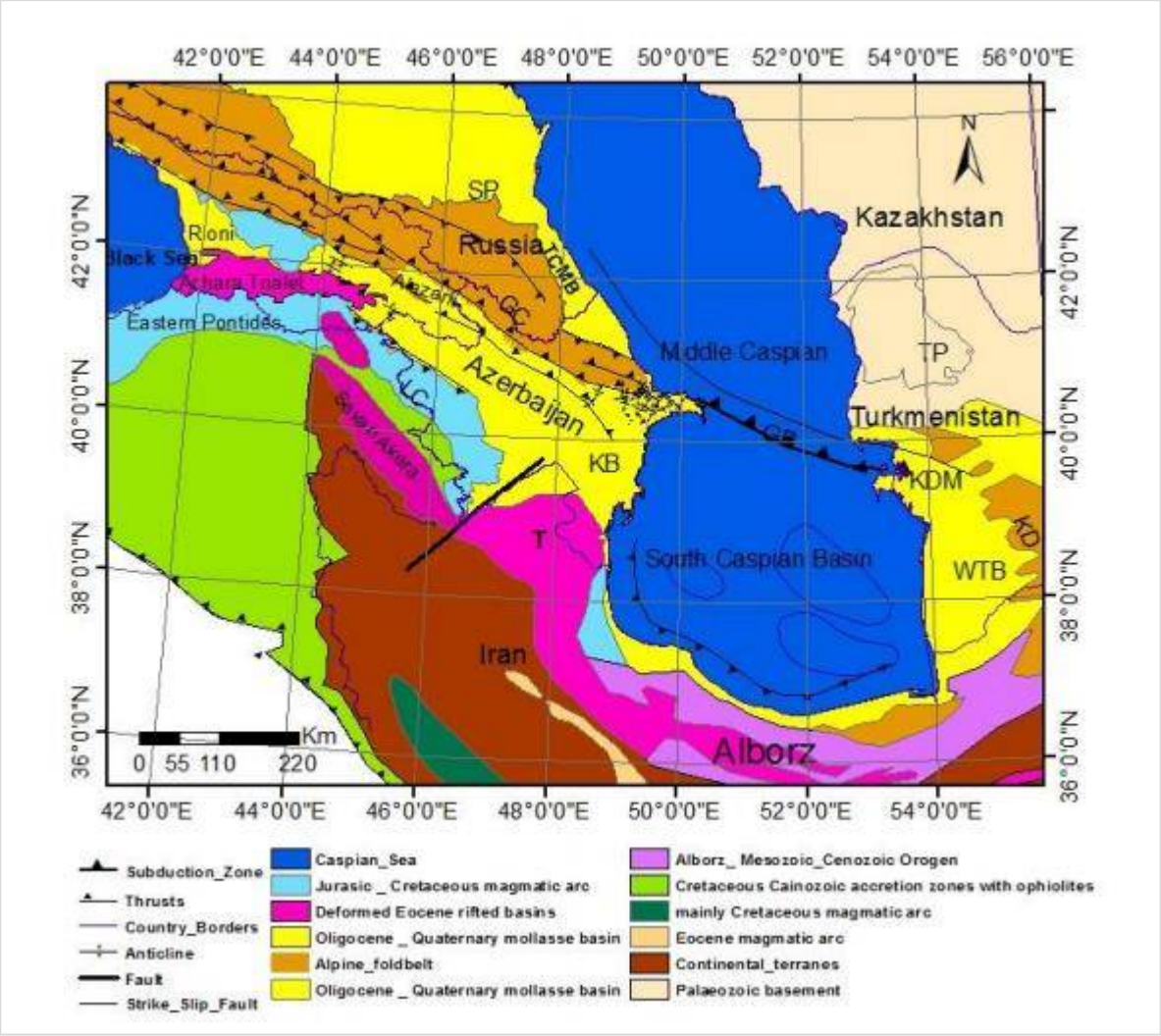
Figure 2.1 PV Plant site boundary

3. Catchment characteristics

3.1 Geology

The geology of Azerbaijan is described in detail by Alizadeh et al. (2016). The varying relief and geology strongly influence climate, hydrology and hydrogeology. The majority of the country consists of sedimentary, volcanic-sedimentary, volcanic and terrestrial deposits across almost the entire stratigraphic range beginning from Pre-Cambrian and through to the Holocene. Figure 3.1 below shows a simplified overview of the geology of the South Caspian area.

Figure 3.1 Simplified geological map of the South Caspian area (Brunet et al, 2003)



A review of the bedrock and superficial geology indicates that the study area is located within a region of Neogene and Quaternary sediments, with a mix of recent volcanic rock and thick clay rich sedimentary sequences. This is supported by the findings of the geotechnical and geological survey undertaken by Masdar (August 2020), which suggested that the underlying geology is dominated by sedimentary complexes. Alluvial-deluvial (edQIV) sediments overlay the bedrock geology and are typically of 2m depth, though reach up to 6m deep in some regions of the Site.

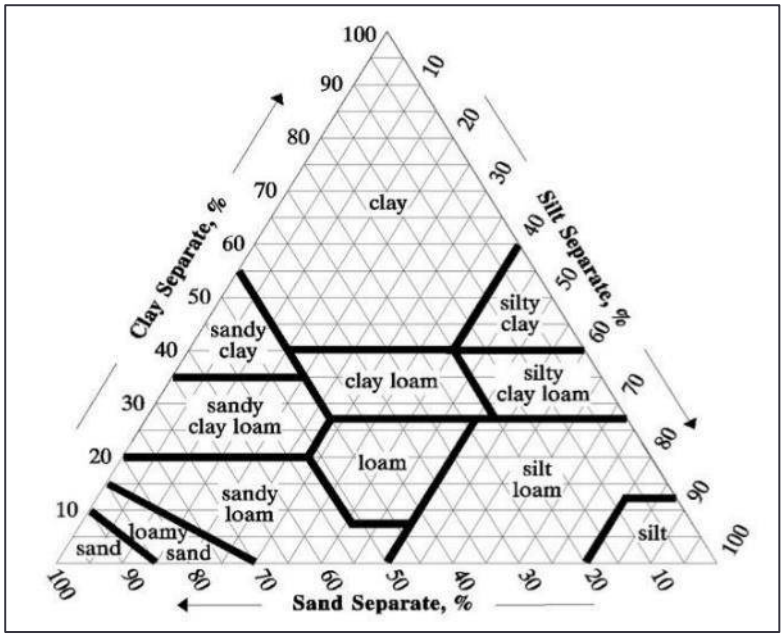
The region is subject to significant tectonism due to its location on an active zone of crustal deformation, caused by the collision of the Arabian and Eurasian tectonic plates. Mud volcanism is present throughout, caused by the upwelling of clay deposits (due to tectonic compression) and the migration and release of gas from shallow, hydrocarbon-rich, deposits.

A review of images of the Gobustan Mud Volcano, approximately 5 km to the south-east of the site boundary, suggests that such volcanism is modern and active. Aerial photography also indicates mud flows due to volcanism have occurred a range of other site close to the study area. The closest visible mud flow is located approximately 1.6 km to the east, with outwash fanning out to the west (i.e., towards the Project site), though information relating to the age and relative timing of this event is unavailable.

3.2 Soils

Soils were classified using the USDA (United States Department of Agriculture) soil textural triangle (USDA, 1999), which defines soil texture classes according to the distribution of size classes of mineral particles less than 2 mm in diameter. The USDA soil textural triangle is shown in Figure 3.2 below.

Figure 3.2 USDA soil textural triangle



The geotechnical and geological survey found that the soils across the Site are typically clay based, of grey and yellowish-brown-grey colour. These contain carbonate dust veins, sandstones, and sand layers, and are sometimes stratified.

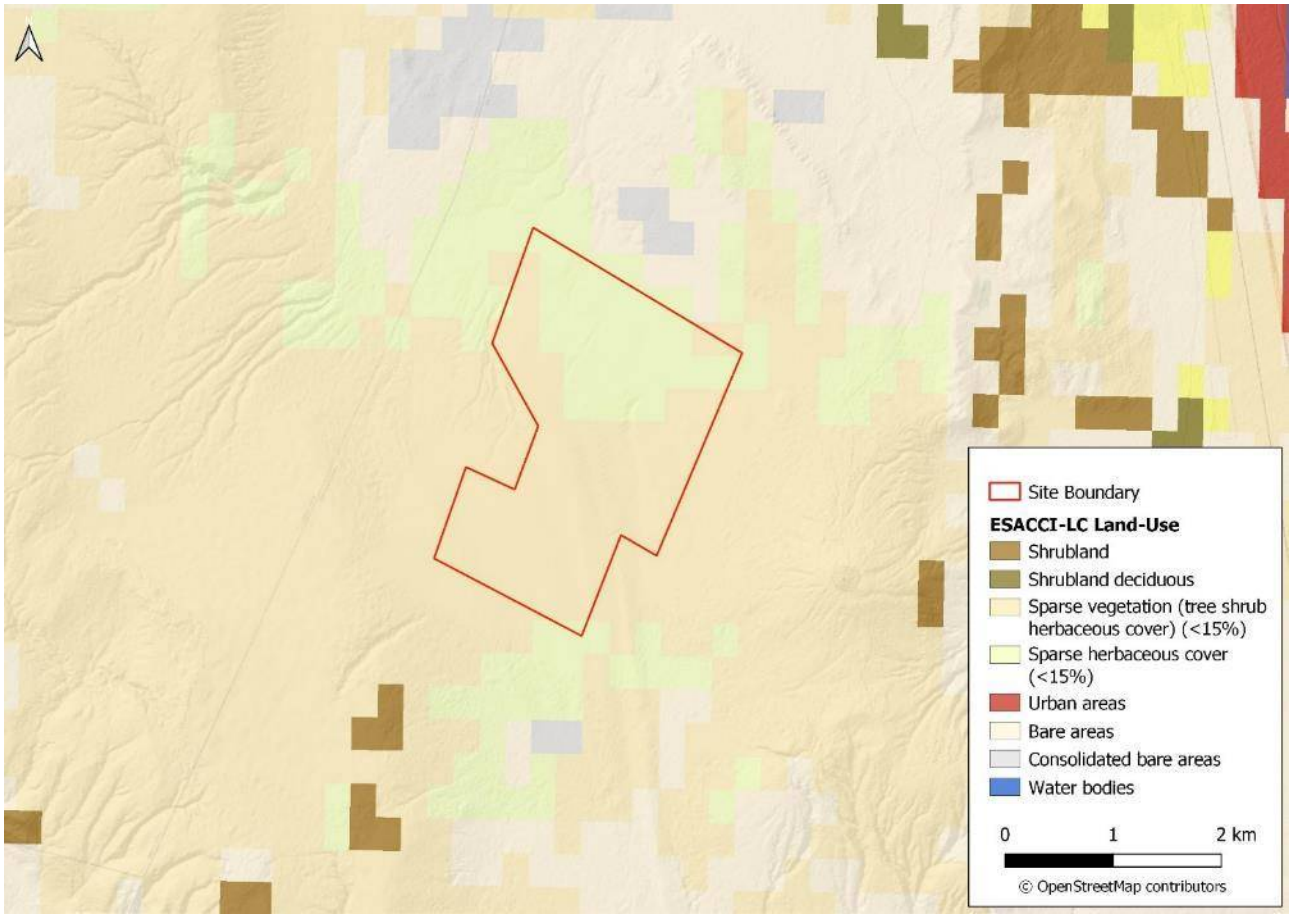
A 250 m resolution grid defining the separate percentages of clay, silt and sand was acquired from SoilGrids.org, a global database provided by the International Soil Reference and Information Centre (ISRIC). Across the proposed Site, grid squares give an average clay-silt-sand percentage of 35-46-19. The dominant soil types across the Site are Silty Clay Loam and Clay Loam, which align to the findings of the geological survey.

3.3 Land-cover

Land-cover across the Project site has been analysed in several ways. Aerial imagery was initially used in combination with site photographs obtained from the site visit in 2020. The vast majority of the site is bare earth with sparse herbaceous vegetation. Some land is being used for livestock grazing. Other land-covers within the site include a network of unsurfaced tracks and footpaths, and a small man-made lake at the eastern boundary of the site. There are no buildings within the site boundary, although the topographical survey and analysis of satellite imagery identifies minor settlements to the north and east of the site boundary, in addition to a further man-made lake and a cemetery to the south of the site.

Global land-cover datasets have been downloaded from several sources, including the European Environment Agency (EEA), Copernicus, and the European Space Agency Climate Change Initiative (ESACCI-LC). The three datasets are of varying spatial resolution and provide differing levels of classification. The EEA dataset defines the land-covers within the site broken down into a mixture of 'shrub cover (deciduous)' and 'cultivated and managed areas'. The Copernicus dataset provides the greatest spatial resolution of the three datasets and defines the majority of the site as 'herbaceous vegetation', with several isolated regions of 'cropland'. The ESACCCI-LC dataset disaggregates the land-uses within the site to 'Sparse vegetation (tree shrub herbaceous cover) <15%' and 'Sparse herbaceous cover <15%'. The ESACCI-LC dataset provides the greatest level of agreement with satellite imagery and photos of the site and surrounding areas, and therefore has been used as a basis to represent the land-cover in the flood model. Neither the satellite imagery or site photos show evidence of the presence of cropland within the site as the EEA and Copernicus datasets suggest. The ESACCI-LC land-use data is displayed in Figure 3.3.

Figure 3.3 ESACCI-LC land cover



3.4 Hydrogeology

The groundwater water system is expected to be dominated by the presence of older (connate) water associated with the upwelling and decompression of saturated sedimentary material. Evidence of this can be observed from a review of photographs of the mud volcanoes, where water ponds are noted in surface depressions close to these sources.

Rates of modern groundwater recharge are expected to the low, given the low annual average rainfall (typically less than 200mm year) combined with the potentially low permeability of the superficial material, given the dominance of clay rich sediments.

Groundwater was not recorded at any level during the drilling works or borehole and trial pits carried out during the geotechnical and geological survey. No evidence has been presented to suggest that there is active baseflow accretion to the surface drainage network, suggesting either that the water table is deep or that the sediments do not form a significant aquifer due to the low permeability of the substrate. In either case, the risk of persistent groundwater flooding is considered to be low.

4. Topography and drainage

4.1 Topography

Project site survey

The topography of the site and surrounding area was captured in a ground survey conducted by ARPA in 2020 (Figure 4.1).

The survey indicates that the elevation at the Project site varies from 149m AMSL (Above Mean Sea Level) in the south-west of the site, to a minimum of 60m AMSL in the north-east. The site spans a catchment divide, with the northern portion and majority of the site sloping north, whilst the southern portion slopes to the south-east. The gradient of the slope across most of the site is shallow, with the vast majority of land having a slope of less than 3°. Steeper sloped regions are observed in the entrenched drainage channels that drain northwards, with localised slope angles of up to 21°.

The survey extent was refined to remove suspected erroneous elevation points identified along the survey extent boundaries to the south and east, identified via comparison against the AW3D DSM described below.

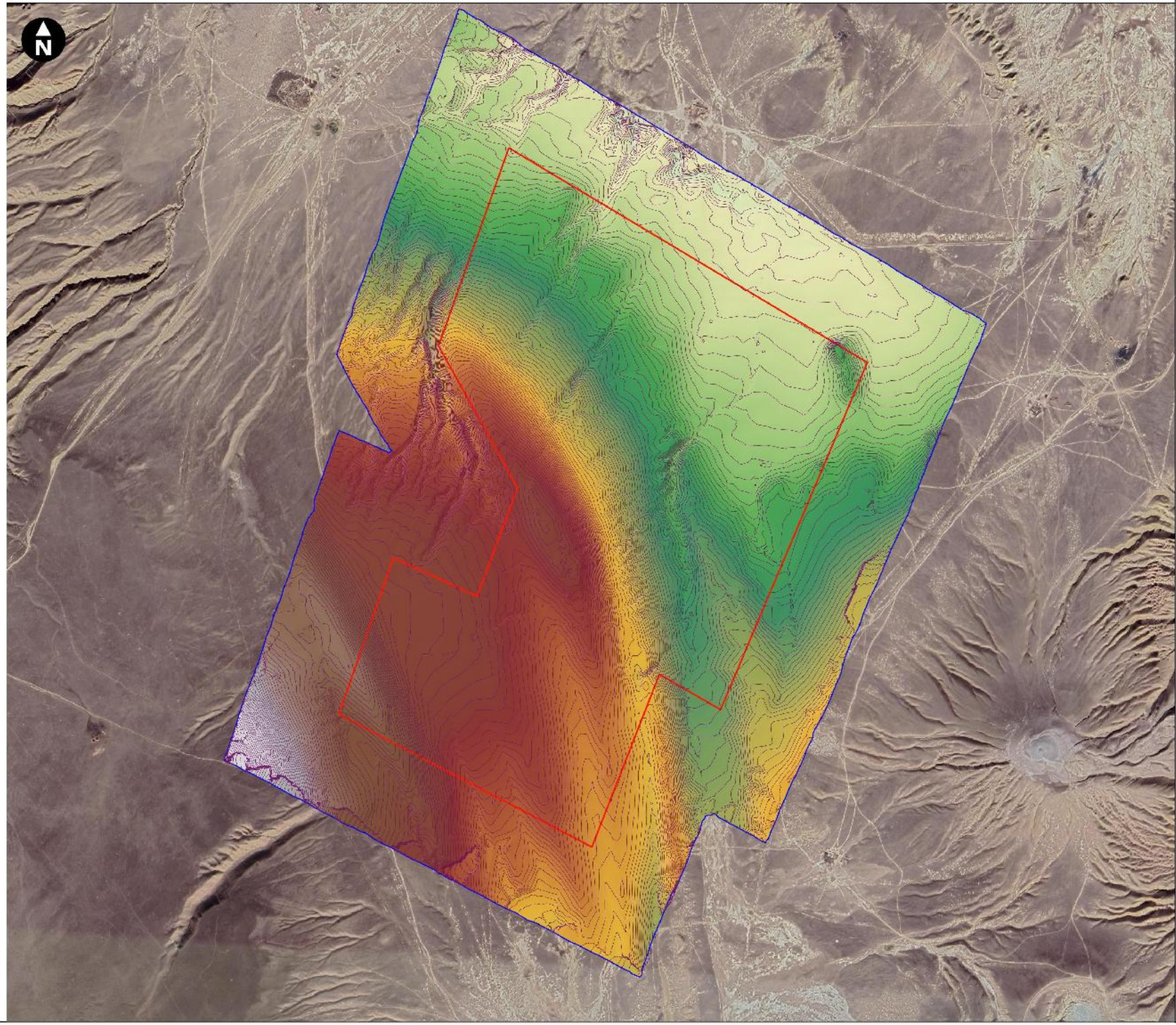


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Figure 4.1
Site Survey

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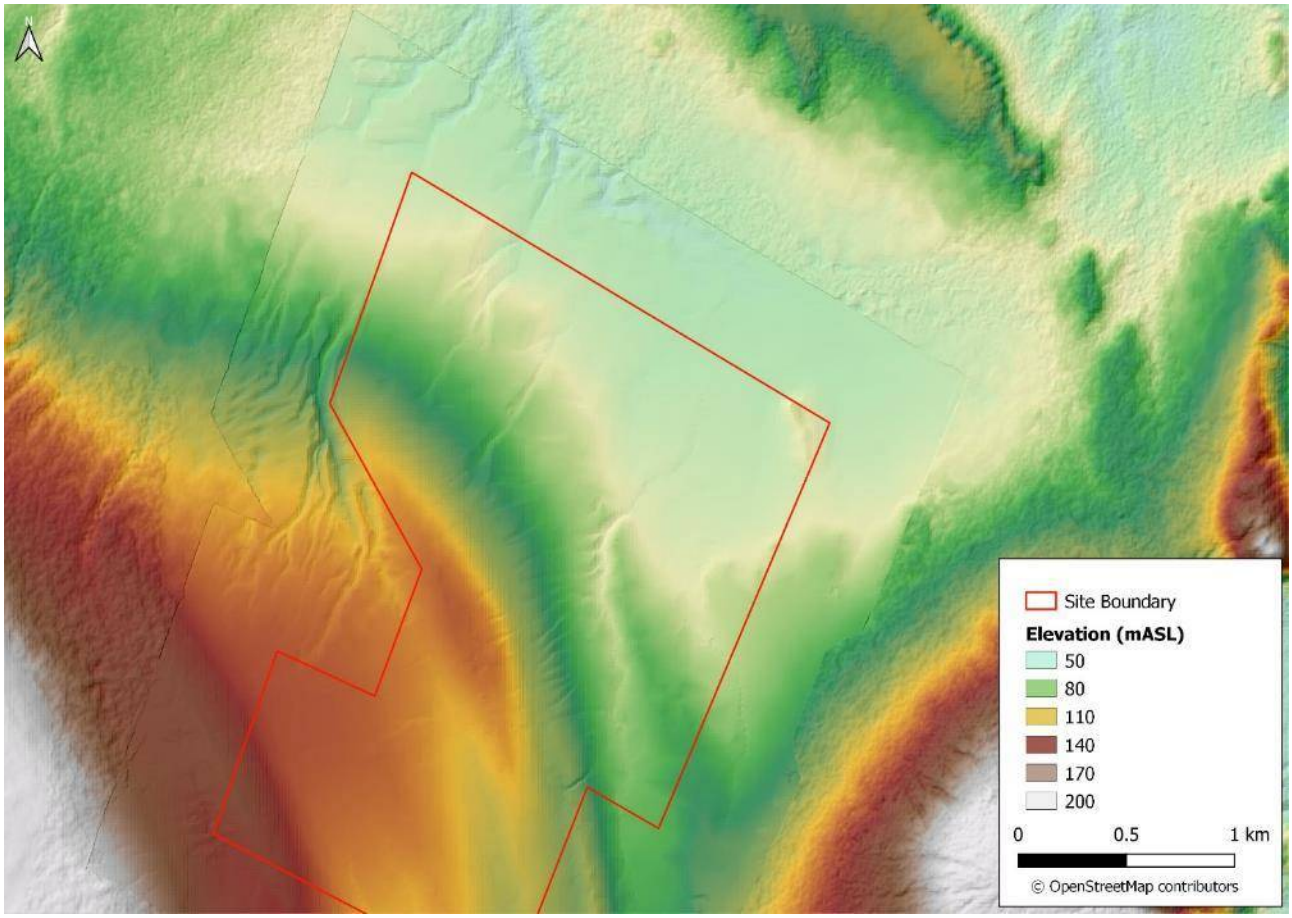
Topography data for the wider area

A Digital Surface Model (DSM) of the wider site area was acquired from ALOS in order to characterise the wider topographic context of the site and include the full contributing catchment areas intersecting the site. A Digital *Surface* Model differs from a Digital *Terrain* Model in that it has not had surface features such as vegetation and trees filtered and removed to express the ground or terrain elevation only. However, as the Project site appears to be predominantly bare earth with sparse vegetation it was deemed that a DSM would be acceptable to use. The supplied DSM had a spatial resolution of 2.5 m.

The ALOS AW3D DSM was analysed against the Project site topographical survey to determine the degree of agreement between the two separate datasets. A raster calculator tool, within the GIS software QGIS, was used to subtract the DSM from the topographical survey model for the area of overlap. The mean divergence of the wider DSM from the topographic survey data was +1.49m, with a standard deviation of 1.23. The disparity between the wider DSM and topographic survey model is most evident on the northern boundary of the of the survey extent, illustrated in Figure 4.3 below, showing a combined dataset with no blending distance. There is a marked 'edge' visible at the join boundary between the two datasets, suggesting strong evidence for a datum shift.

Figure 4.2 Topographic survey vs. AW3D DSM disparity



Based on the above analysis, the wider DSM has been adjusted using the raster calculator tool within QGIS to account for the mean divergence of +1.49m and integrated with the site survey data using a blending distance of 50m to further smooth the transition between the two datasets. The resulting topography layer is shown in Figure 4.3, displaying the improved transition between the survey and wider DSM datasets.

Figure 4.3 Finalised topography dataset

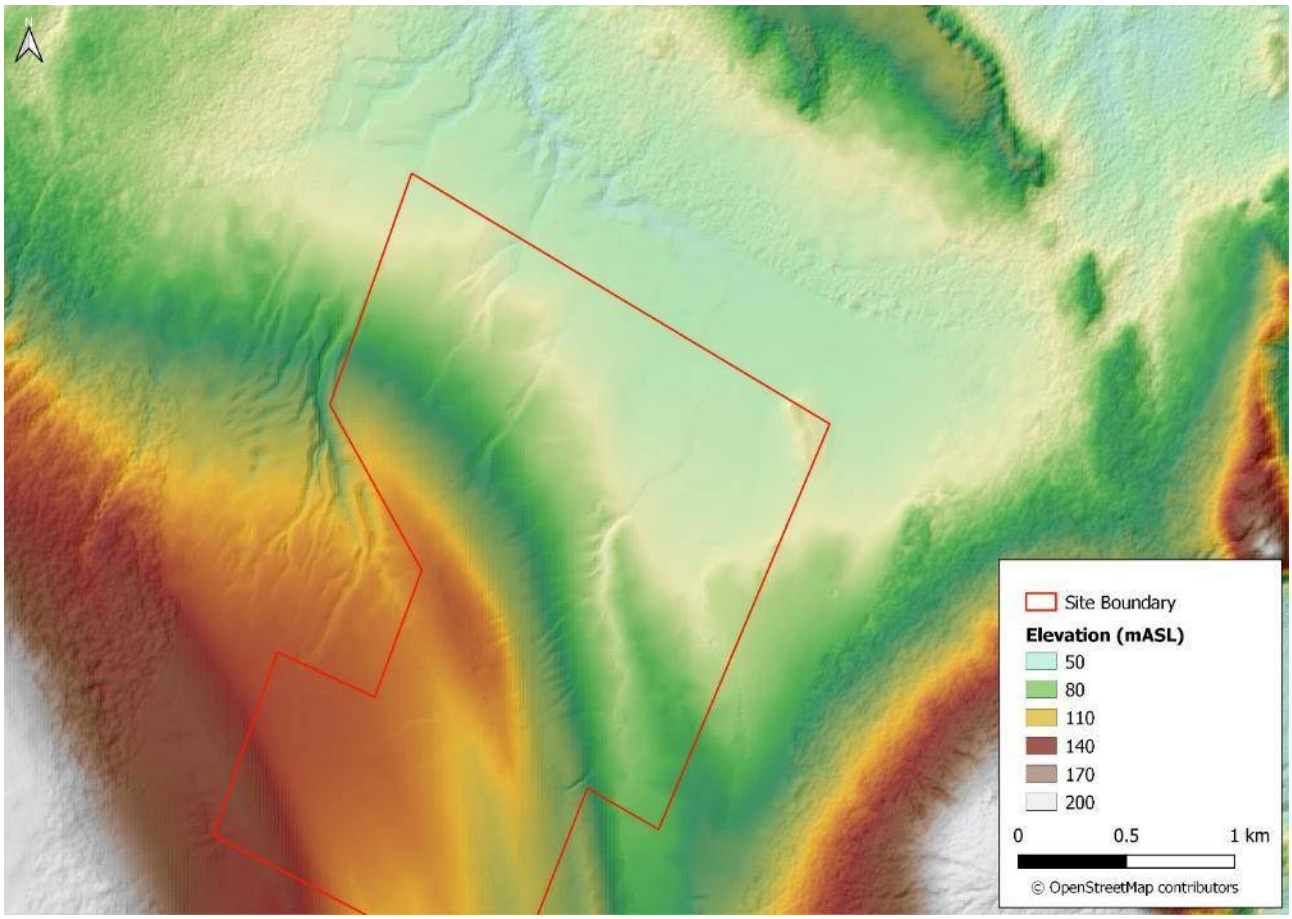


Figure 4.4 below shows the wider topographic overview of the finalised topographic dataset discussed above, including the extent of the topographic survey and refined extent. This formed the terrain model as a basis for the subsequent flood modelling (detailed in section 6.2) and preliminary topographic analysis to determine the runoff pathways and extent of contributing catchments, as described below.

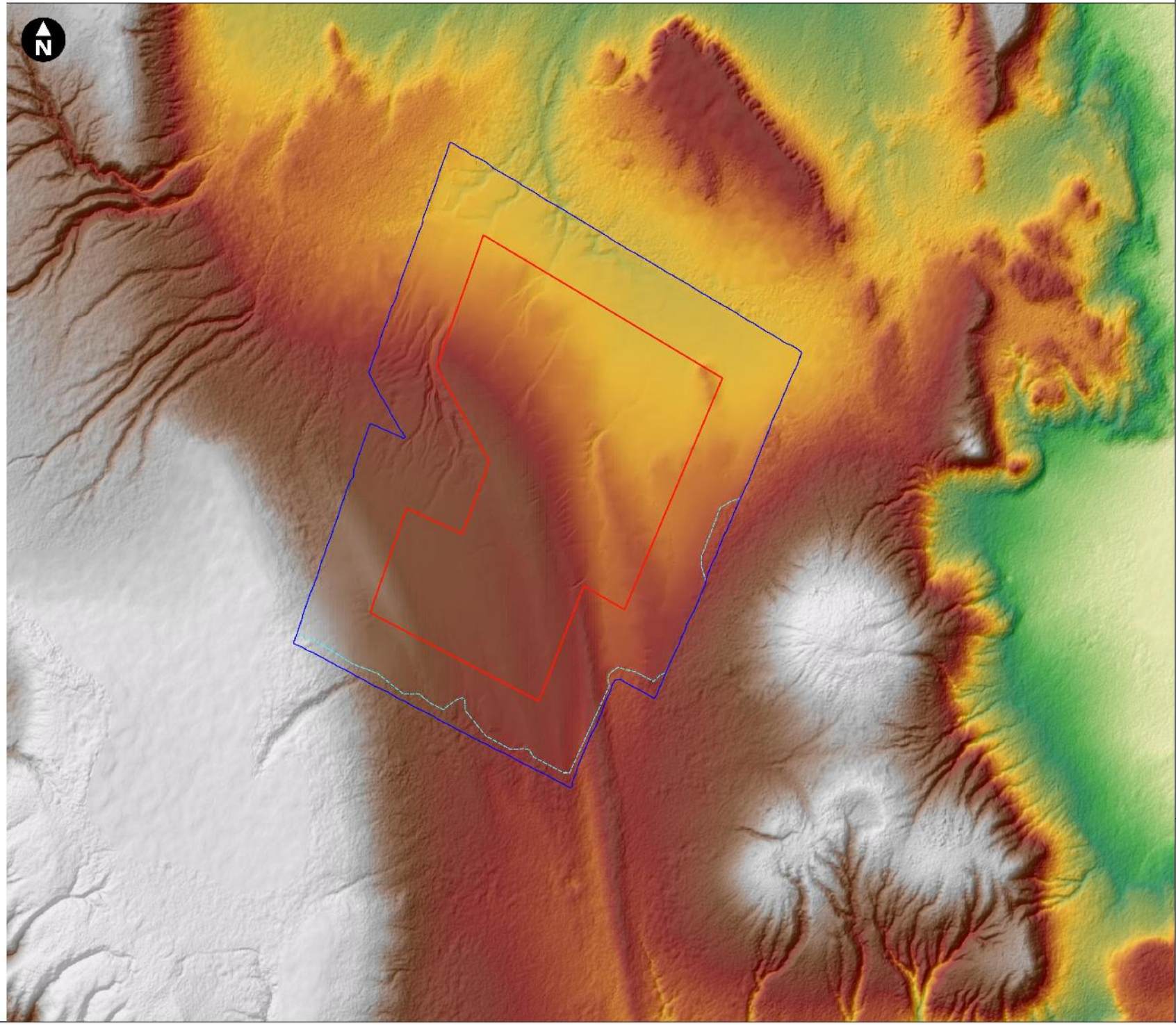


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Figure 4.4
Topographic Overview

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4.2 Catchment and drainage analysis

Detailed drainage and catchment analysis has been undertaken on the wider site topography to identify key runoff pathways and delineate the extent of the contributing rainfall-runoff catchments intersecting the site. This was carried out using ArcHydro tools within the ArcGIS software based on the integrated topography dataset described above. The combined topographic model was conditioned to fill sinks and depressions, allowing for the continuous drainage of water to be modelled. The analysis confirmed the location of the ephemeral watercourses identified from the aerial imagery analysis draining in a Northerly direction across the site. The extent of the contributing catchments and drainage pathways can be seen in Figure 4.5.

As part of the analysis, flow accumulation is analysed whereby each elevation grid cell is assigned a flow accumulation value relating to the number of cells upstream of that cell that drain into it. The contributing sub-catchments and drainage lines have been generated using the default flow accumulation value, representing 1% of the maximum recorded flow accumulation within the area of interest. Therefore, drainage lines are only initiated and defined whereby a cell has a flow accumulation value greater than 1% of the maximum recorded value within the catchment.

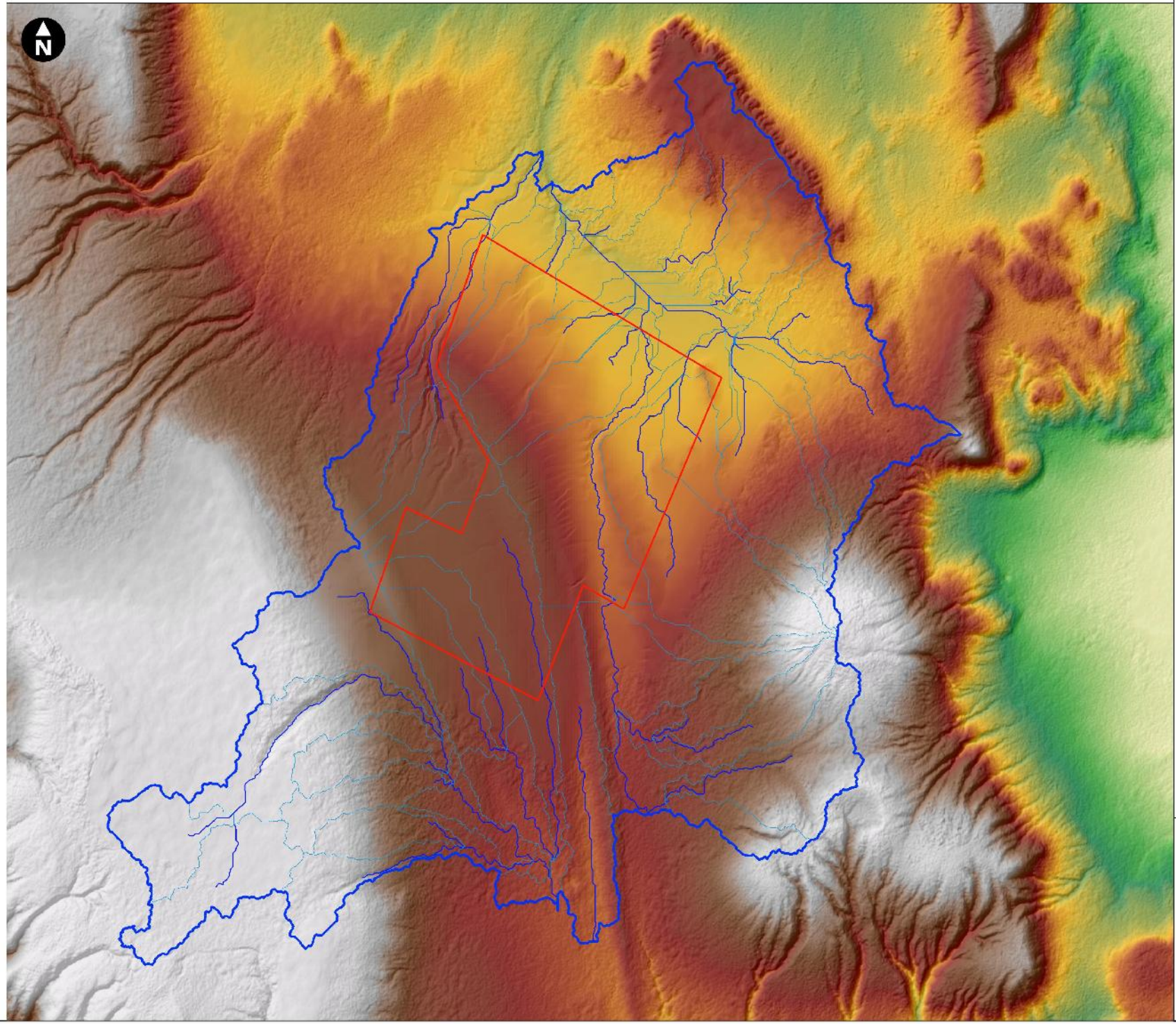

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Figure 4.5
Catchment and Drainage Analysis

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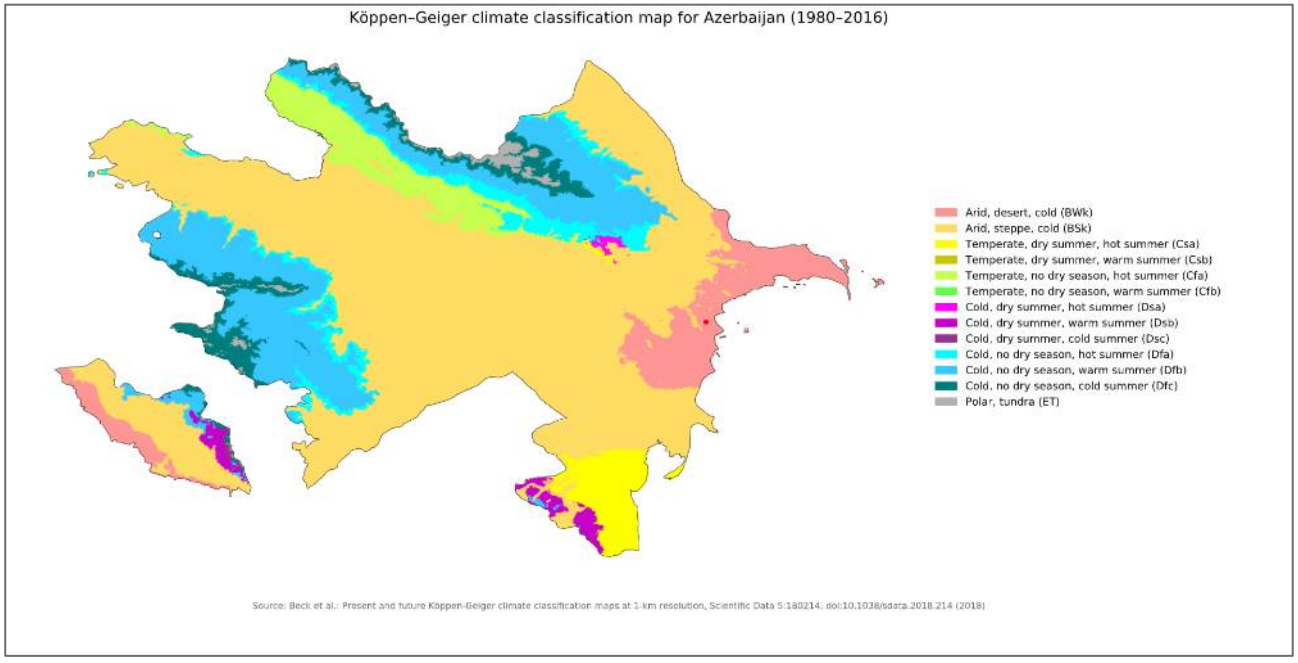
5. Climate and rainfall data analysis

5.1 Climate

The climate of Azerbaijan is diverse and strongly dictated by the topographic landscape of the country, with influences from the Greater Caucasus, Lesser Caucasus, Talysh and North Iranian mountains. The koppen-geiger climate classification for Azerbaijan is shown in Figure 5.1 below, and the approximate Project site location indicated in red.

Figure 5.1 Azerbaijan Koppen-Geiger classification (Beck et al, 2018)



The central portion of the country in the Kur-Araz lowland between the Greater and Lesser Caucasus is largely cold and arid, with mean annual precipitation of less than 200 mm. The Greater and Lesser Caucasus bounding the country to the north and south have temperate and sub-tropical climates on the foothills and plains. The greatest annual precipitation is observed in these regions, with mean annual rates of up to 1600mm and greater.

5.2 Rainfall analysis

Rainfall analysis has been carried out to generate Intensity Duration Frequency (IDF) and Depth Duration Frequency (DDF) curves which are required to estimate rainfall depths for various event durations and frequencies. The definition of design events for further analysis such as surface runoff rates, attenuation volume requirements and the design of drainage components require the data from the IDF curve. This analysis has been carried out for the provision of a hydrology study for Area 60 solar project, located 60 km south-west of Baku, Azerbaijan.

The approach adopted here uses observed daily data from Alat rain gauge station, considered to be representative of the Site. Maximum daily rainfall depths for events up to 0.001% AEP will be calculated from extreme value analysis for daily rainfall, assuming a suitable statistical distribution for the rainfall.

The IDF generated will be used to estimate various duration rainfall hyetographs to inform hydraulic modelling that will be carried out for flood risk and drainage assessments. The total maximum 24-hour rainfall depths will be reported for various return periods and total rainfall hyetographs will be reported for durations 0.5-hour, 1-hour, 3-hour, 6-hour and 12-hours for the 1% AEP event.

Data used

Daily rainfall data for 84 years (from 1936 to 2019) were used for the rainfall analysis. Publicly available global data from NOAA's National Centers for Environmental Information (NCEI) were downloaded for period 1936 to 1991. A comparative study on the daily cumulative rainfall depths and annual mean rainfall depths were carried out for five following rain gauge stations around the Project site:

1. Alat;
2. Baku;
3. Gazimammad;
4. Saljny; and
5. Neftchala.

The location of the rain gauge stations is presented in Figure 5.2. The distance and elevation of the rain gauge stations from the Project site were also taken into consideration and are presented in Table 5.1.

Figure 5.2 NOAA rainfall stations

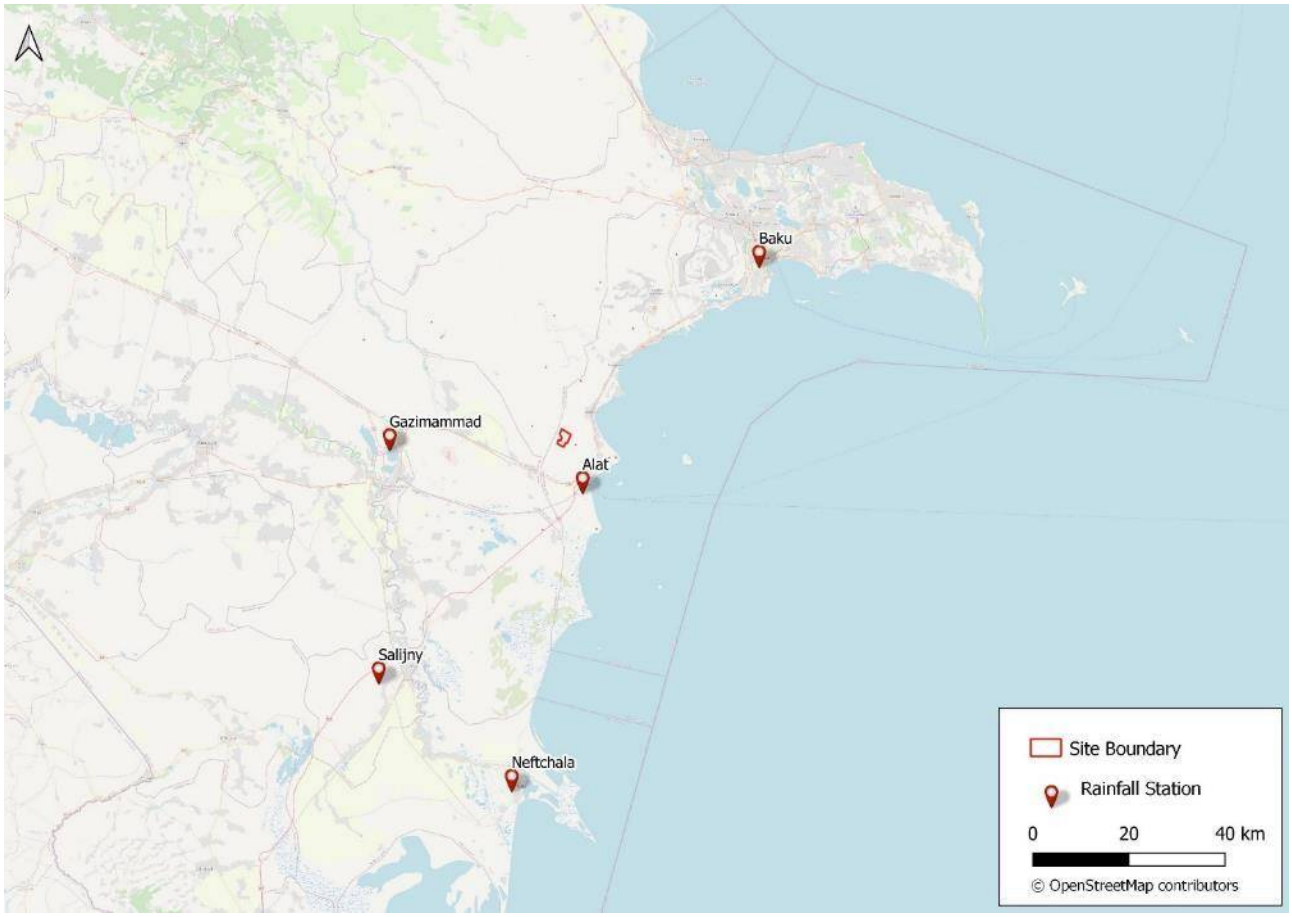


Table 5.1 Elevation and distance of RG stations relative to the Area 60 Project site

RG Station:	Project site	Alat	Baku	Gazimammad	Saljny	Neftchala
Elevation, m (AMSLl)*	117	-16	47	-5	-20	-24
Station distance from site, km	-	8	56	37	61	71
Distance from Caspian Sea, km	6	2	5	40	32	5

* As an inland sea, the Caspian Sea has a typical surface level of around -28m relative to AMSL.

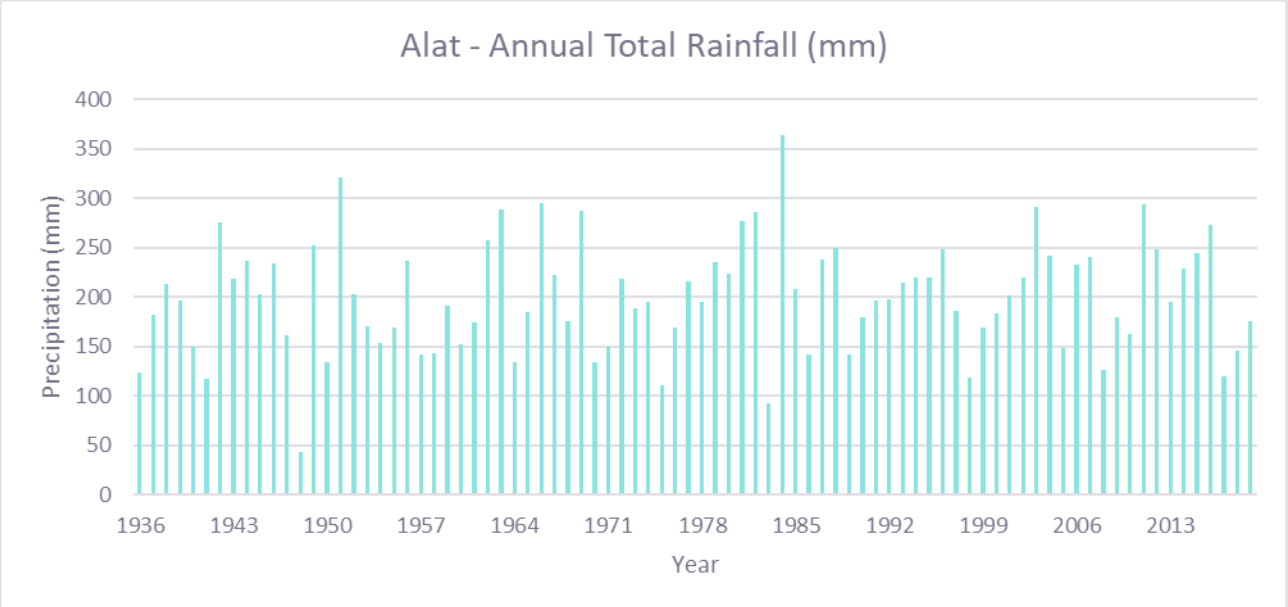
Considering available data period and the proximity from the Project site, Alat was chosen as the most representative rain gauge site. Therefore, further rainfall data from Alat rain gauge station was purchased from the National Hydrological Service Azerbaijan for period 1990 to 2019. These data were supplied as 12-hourly (1990 to 2015) and 3-hourly (2016 to 2019) cumulative rainfall depth data.

Methodology

Daily rainfall depth series was prepared for all five above rainfall gauge stations introduced above and a comparison was made of annual cumulative rainfall at Alat with that at the other four stations to check the consistency of available data. It was found that Alat gauge data was consistent and fit for use in an EVA. A decision was made to purchase recent years data (1990 to 2019) for Alat from the National Hydrological Service Azerbaijan to compare with the overlapping period (1990 and 1991) and add to the rainfall series. A corrected dataset for the years 1990 and 1991 was then provided to Wood as the data for these two compared years were found to be erroneous. All other year rainfall data was considered to be correct.

Some missing daily data for the Alat gauge were filled with the help of available other station data using the Normal Precipitation Ratio method. The Normal Precipitation Ratio method uses long term annual average rainfall from the surrounding station and proportionately estimating the rainfall for the storm. Thus, a daily series for entire period (1936 to 2019) was prepared and taken further for the EVA analysis and then for IDF curve generation, as shown in Figure 5.3 below.

Figure 5.3 Alat annual total rainfall



Rainfall EVA analysis

Annual maximum rainfall series from the daily cumulative rainfall depths (mm) were prepared to carry out the EVA analysis as shown in Table 5.2 below.

Table 5.2 Alat station AMAX from for daily cumulative rainfall

Year	AMAX (mm)	Year	AMAX (mm)
1936	16.00	**1978**	27.10
1937	25.40	**1979**	25.70
1938	28.80	**1980**	31.90
1939	16.20	**1981**	25.70
1940	15.20	**1982**	29.30
1941	22.30	**1983**	19.60
1942	29.50	**1984**	26.70
1943	19.80	**1985**	19.90
1944	38.10	**1986**	16.00
1945	39.50	**1987**	43.00
1946	34.50	**1988**	30.30
1947	51.40	**1989**	19.20
1948	6.00	**1990**	17.70
1949	38.70	**1991**	21.10
1950	22.60	**1992**	25.70
1951	18.90	**1993**	16.20
1952	25.50	**1994**	13.20
1953	11.20	**1995**	24.40
1954	20.60	**1996**	30.20
1955	27.40	**1997**	20.00
1956	33.70	**1998**	9.60
1957	17.10	**1999**	38.20
1958	23.30	**2000**	17.00
1959	14.20	**2001**	18.10
1960	23.90	**2002**	18.80
1961	31.90	**2003**	30.20

Year	AMAX (mm)	Year	AMAX (mm)
1962	22.10	**2004**	22.20
1963	46.30	**2005**	19.00
1964	14.70	**2006**	24.20
1965	14.00	**2007**	30.70
1966	56.99	**2008**	23.70
1967	15.70	**2009**	32.00
1968	18.02	**2010**	20.20
1969	15.19	**2011**	18.40
1970	22.27	**2012**	27.20
1971	9.01	**2013**	19.70
1972	15.56	**2014**	30.40
1973	16.83	**2015**	25.20
1974	32.39	**2016**	21.90
1975	10.11	**2017**	16.00
1976	18.19	**2018**	10.20
1977	32.80	**2019**	10.20
Total years		84 years	
Average annual daily maximum		23.55 mm	

The EVA analysis was carried out assuming a Gumbel distribution with a method of moments (MoM) estimator. Growth factors and corresponding rainfall depths (mm) were derived from the EVA of the Annual Maximum (AMAX) rainfall cumulation series, as shown in Table 5.3 below. The result of the EVA was subsequently taken forward to generate the IDF curve.

Table 5.3 Growth factors and Rainfall depths

AEP	Growth Factor	Rainfall depth, mm
50%	0.934	22.0
20%	1.288	30.3
10%	1.523	35.9
4%	1.819	42.8
2%	2.039	48.0
1%	2.257	53.2
0.5%	2.475	58.3
0.002%	2.762	65.0
0.001%	2.978	70.1
0.0001%	3.698	87.1

IDF curves generation

IDF curves are the intensity of rainfall (usually in mm/hr) curves for a range of storm durations and for a range of return periods. The 24-hour maximum rainfall depths determined from the EVA analysis have been used to derive these curves. In this analysis, the IDF curves were produced using Modified-Temez (Zapata-Sierra et al, 2009) method. The parameters have been manually adjusted so as to match 24-hour (i.e. daily) rainfall intensity derived from the statistical EVA analysis. This manual adjustment of parameters is not free from uncertainties that may lead to underestimate and overestimate of rainfalls for durations other than 24-hour values. Therefore, a check with 12-hour rainfall depth for 10%, 4%, 2%, and 1% AEP events, derived from the 12-hour maximum rainfall series, were made to understand the uncertainties. A comparison has been presented in Table 5.4 below.

Table 5.4 Comparison for 24-hour and 12-hour maximum depth (mm).

AEP	24-hour (Parameterisation) EVA, IDF	12-hour (Check) EVA, IDF
10%	35.9, 35.9	27.8, 27.6
4%	42.8, 42.9	31.9, 32.9
2%	48.0, 48.1	34.9, 36.9
1%	53.2, 53.2	37.9, 40.8

The discrepancy for the 12-hour depth check shows that the results are on the conservative side, so the parameterisation to match 24-hour rainfall depth was considered to be appropriate and the IDF curve generated. The finalised rainfall DDF and IDF values are shown in Table 5.5 and Table 5.6.

Table 5.5 Finalised rainfall DDF values (mm)

Rainfall depth (mm)			**AEP**	
Duration (hr)	**10%**	**4%**	**2%**	**1%**
0.25	6.29	7.52	8.43	9.33
0.50	8.20	9.79	10.98	12.15
1	10.68	12.76	14.30	15.83
2	13.91	16.62	18.63	20.62
3	16.24	19.40	21.74	24.07
6	21.15	25.27	28.32	31.36
12	27.56	32.92	36.90	40.85
24	35.90	42.89	48.07	53.21
48	46.77	55.87	62.62	69.32
72	54.59	65.22	73.10	80.92

Table 5.6 Finalised rainfall IDF values (mm/hr)

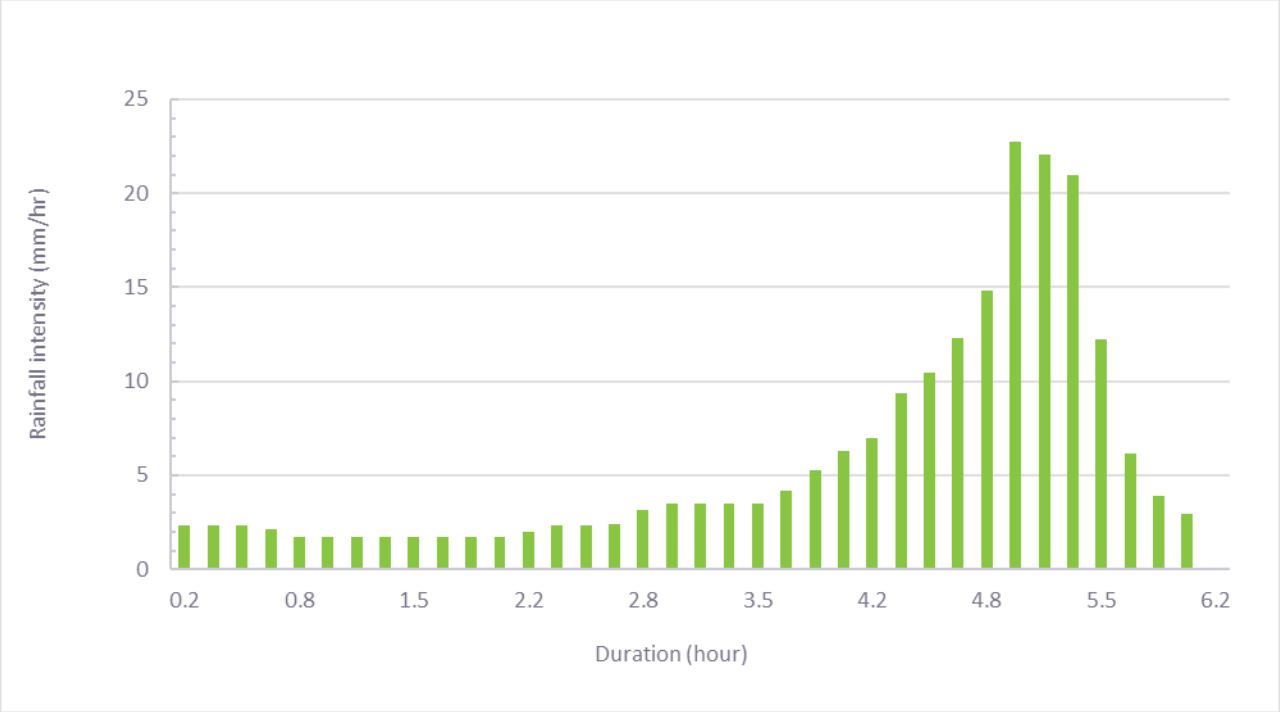
Rainfall intensity (mm/hr)	AEP			
Duration (hr)	**10%**	**4%**	**2%**	**1%**
0.25	25.170	30.068	33.701	37.308
0.50	16.395	19.585	21.952	24.301
1	10.679	12.757	14.298	15.829
2	6.956	8.309	9.313	10.310
3	5.413	6.466	7.248	8.023
6	3.526	4.212	4.721	5.226
12	2.297	2.743	3.075	3.404
24	1.496	1.787	2.003	2.217
48	0.974	1.164	1.305	1.444
72	0.758	0.906	1.015	1.124

5.3 Rainfall Hyetographs

Cumulative Rainfall Profile (CRP)

Rainfall hyetographs are the time distribution of total rainfall intensity over the rainfall event under consideration. Therefore, in order to model, cumulative rainfall needs to be converted to a suitable rainfall hyetograph. Among various rainfall profiles, a profile called Huff fourth quartile (Q4) profile (Huff, 1990) has been selected as an appropriate cumulative rainfall profile to distribute total maximum design rainfall depth over the event duration considered. The Huff Q4 profile means the maximum intensity lies in fourth quartile of the event duration. The Q4 profile has been chosen considering the conservative estimate it gives when peak runoff rates are to be calculated. Rainfall profiles for 0.5 hrs, 1 hr, 3 hr, 6 hr, and 12-hrs have been generated so that they can be applied directly to the pluvial hydraulic modelling. The profile for a 6-hour 1% AEP event as generated using the Huff Q4 profile is shown in Figure 5.4.

Figure 5.4 Huff Q4 rainfall profile for 6-hour 1% AEP event

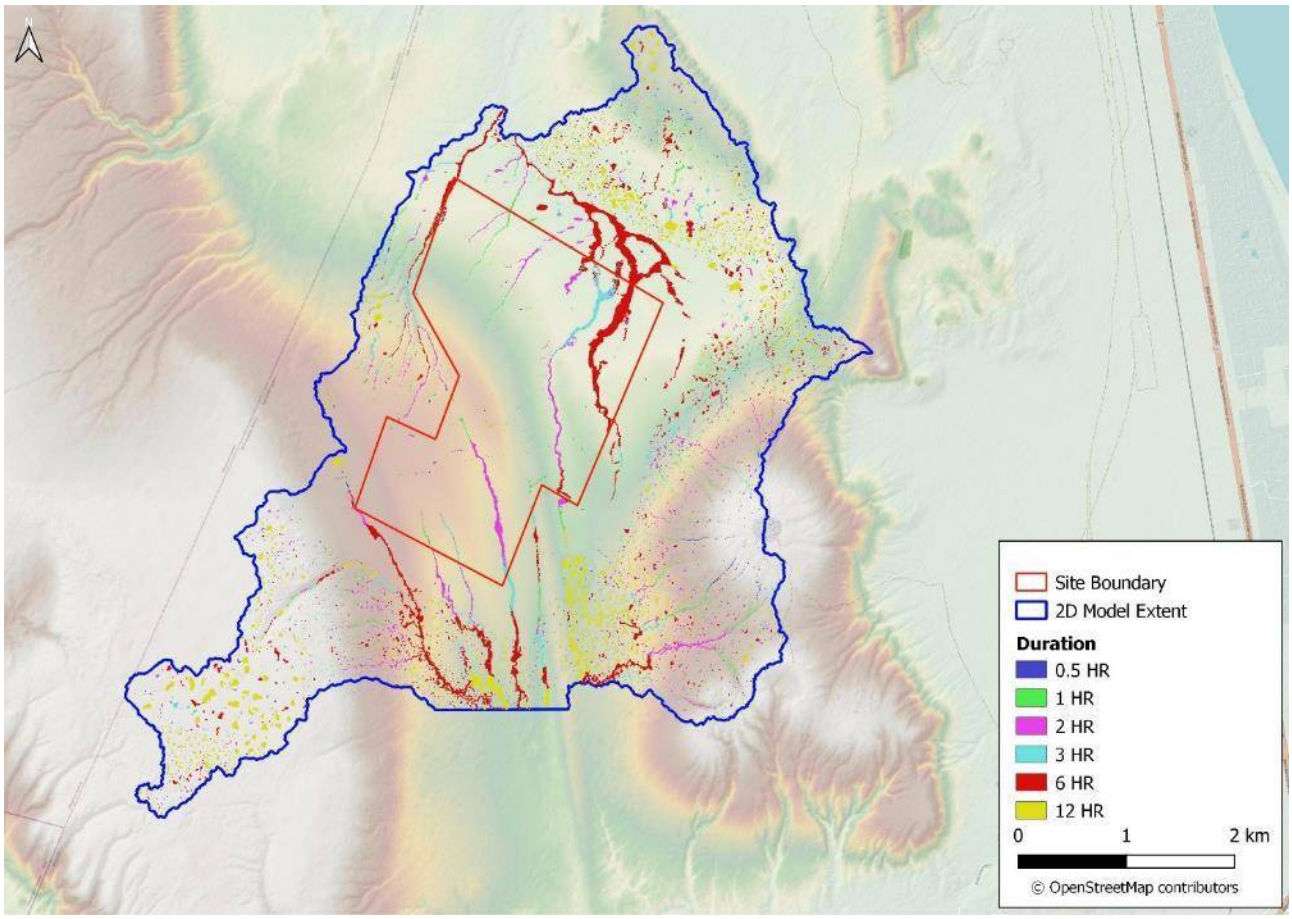


Critical duration

A series of critical duration runs were carried out using the InfoWorks ICM model, described in Section 6, using input hyetographs based on the Huff method for the 1% AEP rainfall event for the following durations: 0.5 hrs, 1 hr, 2 hrs, 3hrs, 6 hrs and 12 hrs.

The results of this assessment have been expressed in terms of a combined maximum flood depth grid across the model domain in Figure 5.5. Flood depth results have been filtered to remove depths of <0.05m, focusing on the main surface water flowpaths only and avoiding shallow ponded water. The grid indicates the storm duration responsible for producing the peak flood depth spatially at each model element. The grid indicates that there is no single storm duration which gives rise to the greatest peak depth across the model domain.

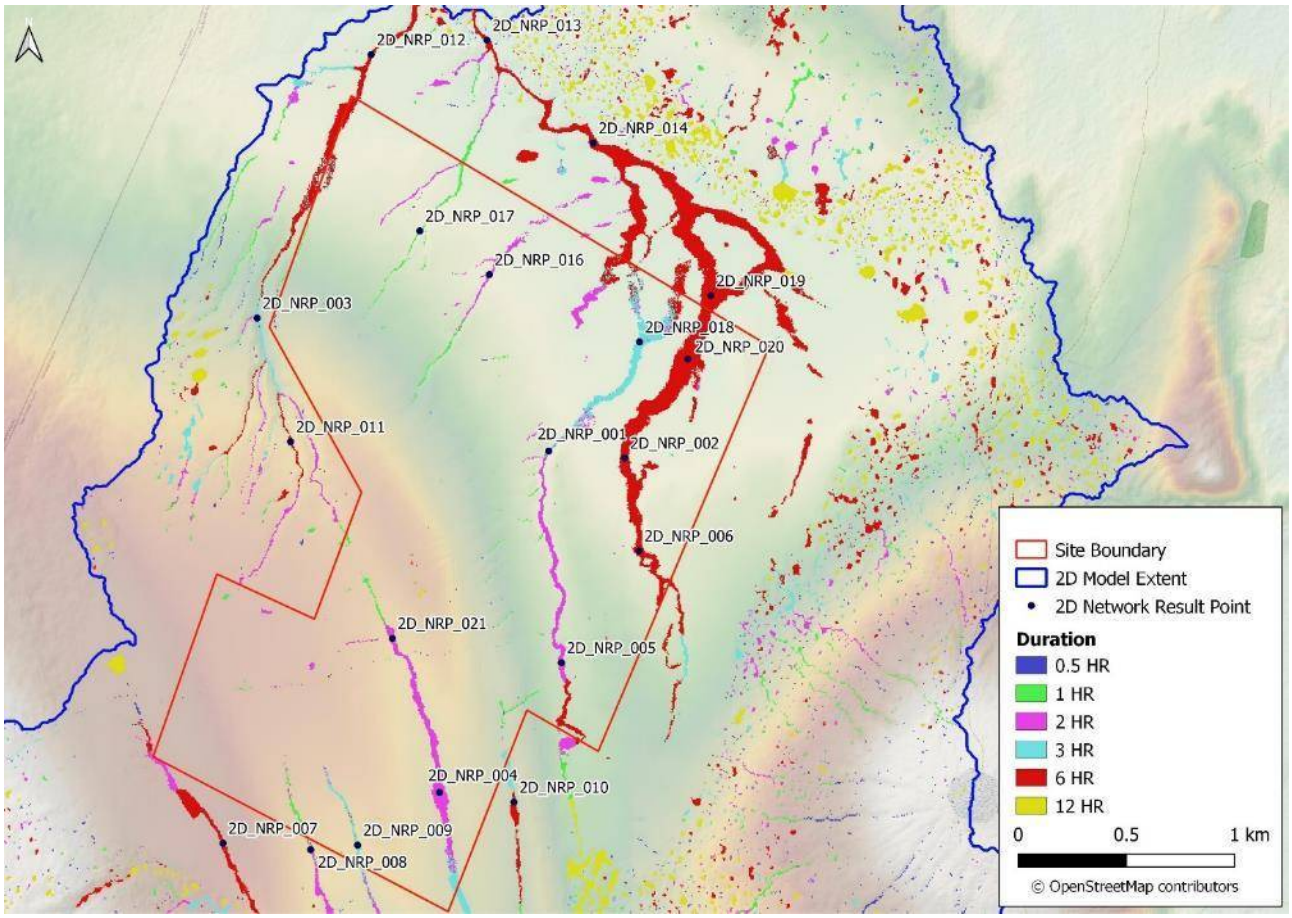
Figure 5.5 Spatial distribution of the critical duration - overview



The upstream portions of the surface water flowpaths and within the Site itself typically report peak depths associated with the shorter duration 1-hour and 2-hour events, whilst the downstream portions report peak depths typically associated with the longer duration 6-hour and 12-hour events.

A zoomed-in overview of the Site and 2D network result points is shown in Figure 5.6.

Figure 5.6 Critical duration assessment and network result points



Peak flood depth results at each of the network result points across the main surface water flowpaths above have been reported in Figure 5.7 below.

Table 5.7 Peak flood depths at 2D network results points

	Duration					
Results Point	**0.5 HR**	**1 HR**	**2 HR**	**3 HR**	**6 HR**	**12 HR**
2D_NRP_001	0.56	0.65	0.71	0.71	0.70	0.62
2D_NRP_002	0.03	0.05	0.07	0.07	0.08	0.07
2D_NRP_003	0.33	0.41	0.44	0.45	0.45	0.36
2D_NRP_004	0.08	0.09	0.10	0.10	0.10	0.08
2D_NRP_005	0.07	0.09	0.11	0.10	0.10	0.08
2D_NRP_006	0.32	0.37	0.41	0.44	0.46	0.42
2D_NRP_007	0.27	0.32	0.35	0.36	0.37	0.33

	Duration					
2D_NRP_008	0.07	0.08	0.08	0.08	0.07	0.05
2D_NRP_009	0.22	0.24	0.25	0.25	0.25	0.23
2D_NRP_010	0.25	0.33	0.38	0.40	0.43	0.42
2D_NRP_011	0.47	0.50	0.54	0.54	0.55	0.51
2D_NRP_012	0.26	0.32	0.37	0.38	0.38	0.32
2D_NRP_013	0.26	0.35	0.45	0.50	0.62	0.54
2D_NRP_014	0.46	0.56	0.65	0.69	0.76	0.70
2D_NRP_016	0.04	0.05	0.05	0.05	0.05	0.03
2D_NRP_017	0.08	0.09	0.09	0.08	0.07	0.05
2D_NRP_018	0.20	0.23	0.25	0.25	0.25	0.22
2D_NRP_019	0.05	0.07	0.09	0.09	0.11	0.10
2D_NRP_020	0.03	0.05	0.06	0.07	0.08	0.07
2D_NRP_021	0.08	0.09	0.10	0.10	0.10	0.07

Note: Network results point '2D_NRP_015' has been omitted. Results are reported to 2 decimal places, and highlighted results indicate peak depths.

The result points indicate that there is typically only minor variation (<0.02m) in the peak depths reported within the Project site between the 2, 3 and 6-hour duration storms.

The 2-hour storm produces the greatest flood depths across the majority of the flowpaths and result points within the Site itself. Where this is the case the magnitude of difference from the 3-hour duration peak depths is typically negligible (<0.01m).

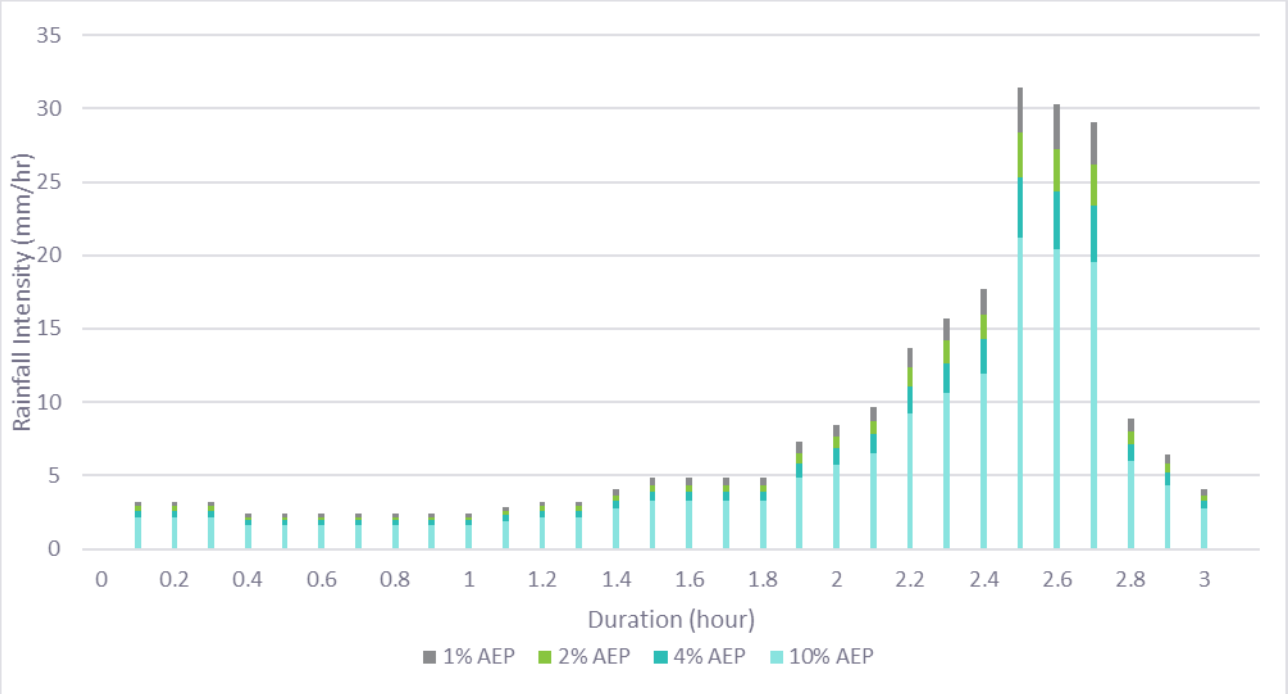
At result points 002, 006 and 020 the 6-hour duration storm is responsible for the peak depths, with a maximum divergence from the 2-hour and 3-hour storm durations observed at result point 006. Along this flowpath, the magnitude of divergence from the peak flood depth is greatest for the 2-hour duration.

Based on this analysis, the 3-hour duration storm is considered to be the critical duration to the Site. Although Table 5.7 shows that the 3-hour storm is not widespread as the critical duration event, it represents a suitable compromise position between the 2-hour and 6-hour storms.

Design Hyetographs

The combined 3-hour duration design hyetographs are shown in Figure 5.7 below, and the individual hyetographs are provided in Appendix A.

Figure 5.7 Combined 3-hour duration design hyetographs

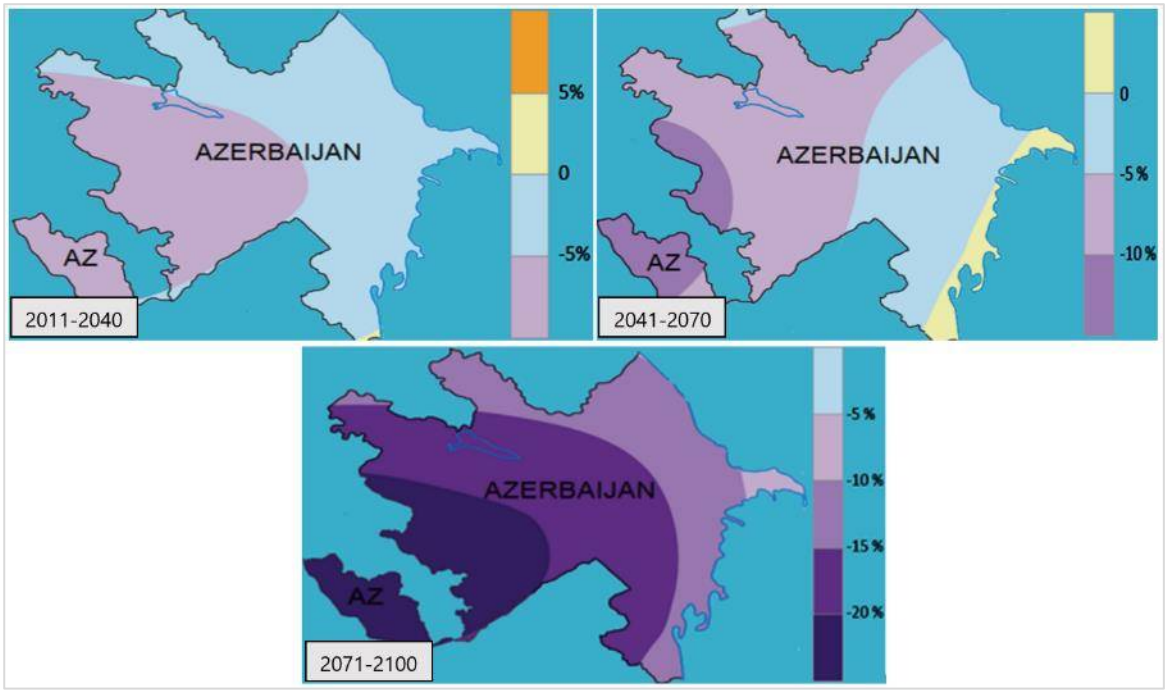


5.4 Climate change

Climate change projections on the impact to rainfall regime in Azerbaijan are typically limited. However, the available research suggests that Azerbaijan will experience reduced annual river runoff and peak flood discharge due to the influence of regional climate change (MENR 2015; Makhmudov 2016).

Figure 5.8 below displays HADCM3 annual total rainfall model projections for the three epochs 2011 to 2040, 2041 to 2017, and 2071 to2100. It is anticipated that annual rainfall totals will reduce by up to 15% within the wider region of the proposed Site in Eastern Azerbaijan by 2100 (MENR 2015).

Figure 5.8 HADCM3 annual rainfall climate change projections: 2011-2040; 2041-2070; 2071-2100 (MENR 2015)



Given the limited research and uncertainty on the impacts of climate change to the future rainfall regime of Azerbaijan, both in terms of annual change and impacts to rainfall intensity, no allowance has been made for climate change in the flood modelling described in Section 6.

6. Flood modelling

6.1 Overview of approach

Flooding can be caused by several different sources, including:

- Rivers and watercourses;
- Groundwater emergence;
- Artificial sources such as reservoirs, tanks, culvers, pipelines and sewers;
- Runoff caused by heavy rainfall.

As noted in Section 5, there are no permanent watercourses within the Project site boundary. The analysis of the topography and underlying geology suggest that the risk of groundwater flooding is low. There is no evidence from photographs of the Project site, nor from aerial photography of any significant artificial sources of flood risk. Whilst the Project site survey data and analysis of satellite imagery has identified several impounding irrigation ponds, these are not considered to pose a significant risk to the Project in the event of a failure given their relative size.

As such, the only significant source of flood risk to the site is considered to be pluvial, from runoff arising from extreme rainfall. This is evidenced by the ephemeral channels draining to the north in the northern and eastern portions of the site evident from aerial photography.

Due to the nature of risk to the site, the modelling approach focuses on pluvial flood risk through the development of a 2D direct rainfall model. The model simulates the runoff generation process by applying design storm hyetographs to a 2D surface, including properties such as surface roughness and runoff coefficients, to route the resulting runoff over the surface of the site. The model development process is described in Section 6.2 below.

A range of scenarios of differing probabilities of occurrence were selected for assessment through the hydraulic model. These consist of the following AEP storm events:

- 1 in 10 years (10% AEP);
- 1 in 25 years (4% AEP);
- 1 in 50 years (2% AEP); and
- 1 in 100 years (1% AEP).

6.2 Hydraulic model build

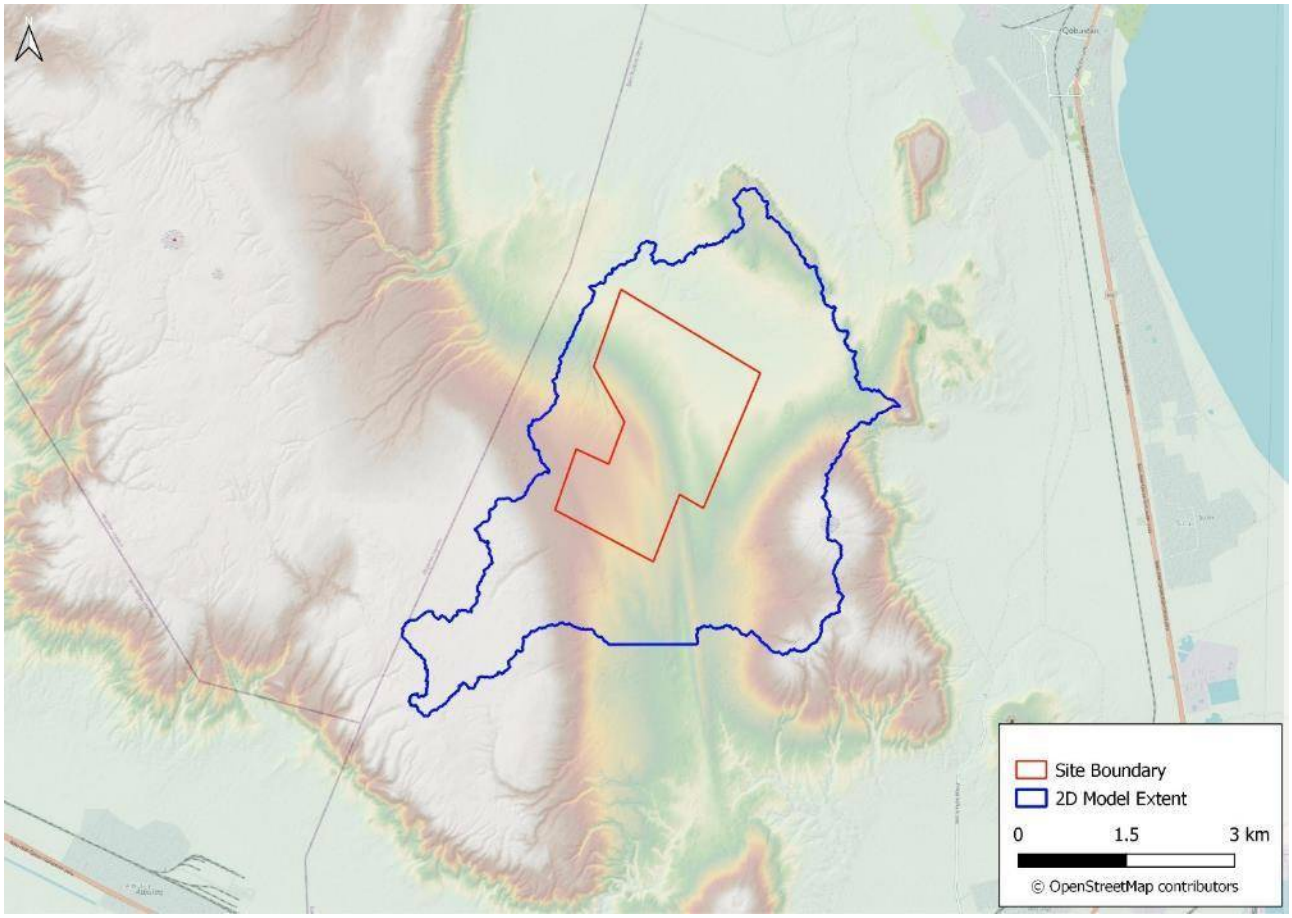
Software

Innvoyze's InfoWorks ICM (Integrated Catchment Model) hydraulic modelling package (version 10.0.6, released May 2019, Innovyze, 2019) was selected as the platform for developing the model. InfoWorks ICM allows detailed representation of flood flow pathways across a two-dimensional (2D) surface arising from direct rainfall, and offers considerable flexibility in the representation of the land surface, in the input hyetograph and surface properties.

Model domain

The 2D model represents the land surface as an irregular triangular mesh. Each triangle is assigned an elevation, along with a range of other properties, forming a surface over which flood water can flow. Displayed in Figure 6.1, the extent of the 2D model domain has been dictated by the topographical catchment analysis defined in section 4.2, including all contributing catchments that intersect the site. The model extent has been simplified where main drainage pathways intersect the boundary, to ensure the 2D domain sits perpendicular to the direction of flow.

Figure 6.1 2D model domain



The use of an irregular mesh allows the addition of more detail and complexity in locations where this is required – a feature that has been used to add detailed representation of features considered to be important in defining flood flow. The size and formation of the individual triangles making up the model domain are dictated by a number of model objects which are described below:

- The **2D Zone** defines the model domain and general rules that the mesh formation needs to adhere to such as maximum triangle size, minimum element area, and maximum height variation allowed across a triangle. The overall extent of the site model, as defined by the 2D zone is shown in Figure 6.1.
- **Mesh Level Zones** are used to dictate the formation of the triangles to allow better definition of specific topographical features. They can also be used to adjust the element elevation.
- **Roughness Zones** are used to define areas with specific surface roughness characteristics, such as roads, buildings and trees.

- **Infiltration Zones** are used to define the underlying runoff coefficient, based upon the slope, soil type, and land-cover described in Section 6.3 and shown in Figure 6.3.

The parameterisation of these different model elements for the site are described in the following sub-sections.

Terrain model

The terrain model underlying the ICM flood model was based on the creation of a TIN (Triangular Irregular Network), which interpolates a surface using the combined terrain model, consisting of the 2.5m resolution topographic model derived from local topographical survey for the Project site itself, and the 2.5m AW3D DSM for surrounding areas.

Surface roughness

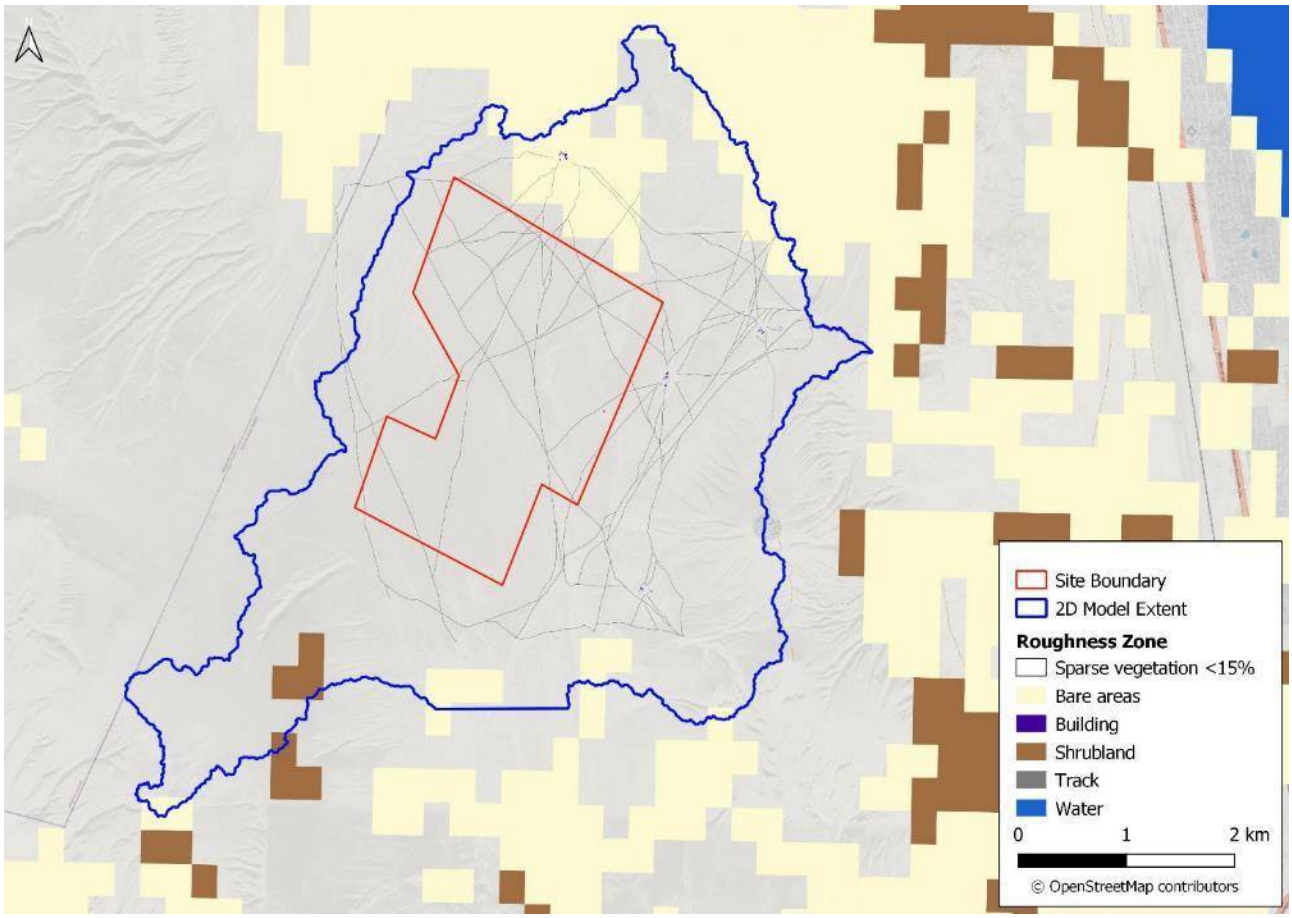
A surface roughness coefficient (referred to as Manning's n) is used in ICM to express the resistance of the land surface to overland flow. A land-use layer was created in ArcMap using a combination of data from the ESACCI-LC global land-use cover, site survey data, and satellite imagery. The ESACCI-LC land-cover classifications have been simplified to the respective roughness zones in Table 6.1. The ground survey identified several minor surface water bodies and a minor settlement at the eastern Project site boundary, in addition to a cemetery to the south of the Project site boundary. The land-cover and survey data has been further augmented by digitising main footpaths and tracks identified via satellite imagery in the vicinity of the Project site boundary, and additional building features outside of the survey coverage.

Table 6.1 Roughness coefficients for land-use types

ESACCI-LC land cover	Simplified land cover	Roughness coefficient (Manning's n)
Water bodies	Water	0.04
Sparse vegetation (tree shrub herbaceous cover) <15% Sparse herbaceous cover <15%	Sparse vegetation <15%	0.025
Shrubland Shrubland deciduous	Shrubland	0.05
Consolidated bare areas Bare areas	Bare areas	0.02
Urban	Urban	0.017
Satellite/Survey land cover		**Roughness coefficient (Manning's n)**
Buildings		0.3
Tracks		0.02
Water		0.04

The resulting roughness zones are shown in Figure 6.2. The predominant land-cover within the 2D Zone is 'Sparse vegetation <15%', and this is not included in the roughness zones below since the associated roughness value has been assigned as the default value within the 2D Zone for simplification.

Figure 6.2 Model Roughness Zones



6.3 Runoff coefficients

A runoff coefficient expresses the proportion of incident rainfall which is converted to surface runoff. This is dependent on a number of factors including soil texture, vegetation cover, slope and antecedent soil moisture condition.

Several methods have been considered, namely the Soil Conservation Service Curve Number (SCS-CN) method (Natural Resources Conservation Service, 2004), and a rainfall runoff coefficient relating to land cover, soil texture and slope following the 'WetSpa' methodology outlined in Liu and Smedt (2004).

The SCS applies an empirical equation to estimate effective rainfall and losses to infiltration through specifying a Curve Number (CN) to represent the land cover/land use type and soil texture. The SCS method produces a net rainfall hyetograph by accounting for the infiltration losses determined by the CN. A runoff coefficient grid expressing the spatial variability in this parameter across the model domain has been generated based on land cover type and soil texture. Land cover data within the 2D model domain shown in Figure 3.3 has been simplified using a conservative approach and considered as bare areas across the entire model domain. This assumption is based on review of satellite imagery and site visit photographs, which suggest that sparse vegetation across the Project site is likely ephemeral, and therefore this assumption would be plausible and represent a reasonable worst-case scenario. Soil classes have been categorised using

the USDA soil textural triangle, characterising soil by their relative fractions of sand, silt, and clay, based on the ISRIC dataset detailed in Section 3.2. Two soil types are present across the model domain, clay loam and silty clay loam, which are both classified into the hydrological soil category D. The above analysis therefore provides a SCS-CN number of 94 across the model domain.

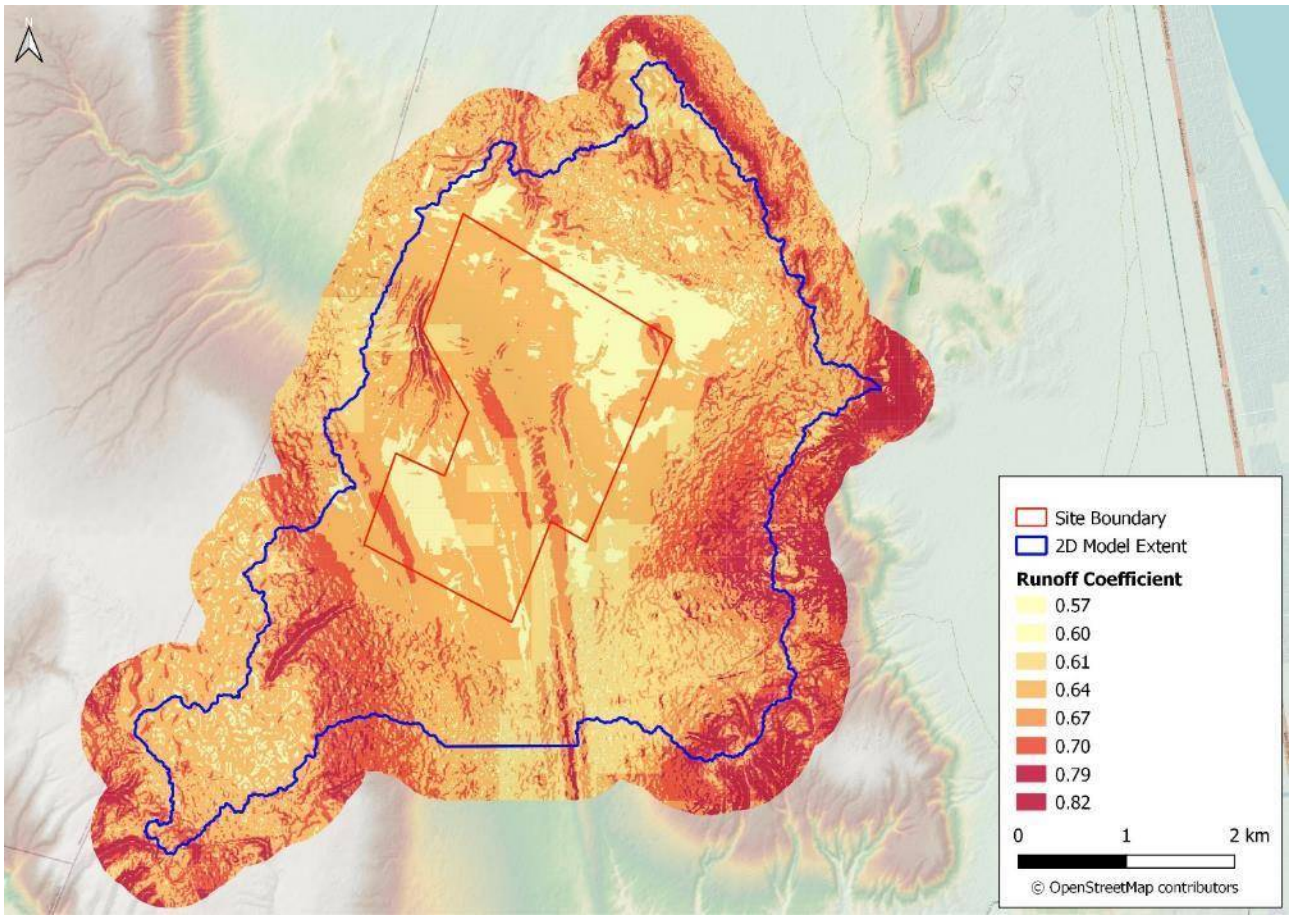
The WetSpa runoff coefficient methodology is similarly based on land cover and soil texture, though also incorporates the underlying slope, classified into four bands outlined in Table 6.2 below.

Table 6.2 WetSpa runoff coefficient methodology (Liu and De Smedt, 2004)

Land use	Slope (%)	Sand	Loamy sand	Sandy loam	Loam	Silt loam	Silt	Sandy clay loam	Clay loam	Silty clay loam	Sandy clay	Silty clay	Clay
Forest	<0,5	0.03	0.07	0.10	0.13	0.17	0.20	0.23	0.27	0.30	0.33	0.37	0.40
	0,5-5	0.07	0.11	0.14	0.17	0.21	0.24	0.27	0.31	0.34	0.37	0.41	0.44
	5-10	0.13	0.17	0.20	0.23	0.27	0.30	0.33	0.37	0.40	0.43	0.47	0.50
	>10	0.25	0.29	0.32	0.35	0.39	0.42	0.45	0.49	0.52	0.55	0.59	0.62
Grass	<0,5	0.13	0.17	0.20	0.23	0.27	0.30	0.33	0.37	0.40	0.43	0.47	0.50
	0,5-5	0.17	0.21	0.24	0.27	0.31	0.34	0.37	0.41	0.44	0.47	0.51	0.54
	5-10	0.23	0.27	0.30	0.33	0.37	0.40	0.43	0.47	0.50	0.53	0.57	0.60
	>10	0.35	0.39	0.42	0.45	0.49	0.52	0.55	0.59	0.62	0.65	0.69	0.72
Crop	<0,5	0.23	0.27	0.30	0.33	0.37	0.40	0.43	0.47	0.50	0.53	0.57	0.60
	0,5-5	0.27	0.31	0.34	0.37	0.41	0.44	0.47	0.51	0.54	0.57	0.61	0.64
	5-10	0.33	0.37	0.40	0.43	0.47	0.50	0.53	0.57	0.60	0.63	0.67	0.70
	>10	0.45	0.49	0.52	0.55	0.59	0.62	0.65	0.69	0.72	0.75	0.79	0.82
Bare soil	<0,5	0.33	0.37	0.40	0.43	0.47	0.50	0.53	0.57	0.60	0.63	0.67	0.70
	0,5-5	0.37	0.41	0.44	0.47	0.51	0.54	0.57	0.61	0.64	0.67	0.71	0.74
	5-10	0.43	0.47	0.50	0.53	0.57	0.60	0.63	0.67	0.70	0.73	0.77	0.80
	>10	0.55	0.59	0.62	0.65	0.69	0.72	0.75	0.79	0.82	0.85	0.89	0.92
IMP		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

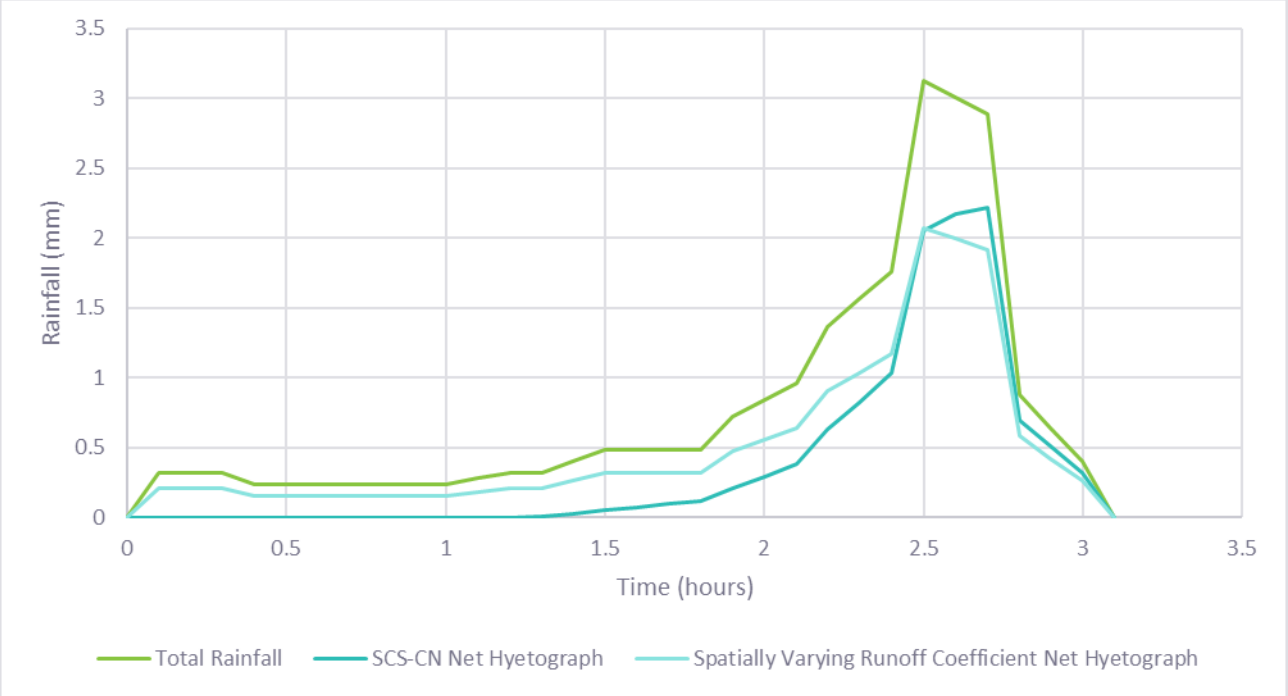
As in the SCS-CN technique, the land cover has been simplified to assume bare areas across the entire model domain applying a conservative approach. Slope has been analysed and classified based on the underlying merged topography layer detailed in Section 4.1. The resulting runoff coefficients vary between 0.57 and 0.82 across the model domain are shown in Figure 6.3 below.

Figure 6.3 WetSpa estimated runoff coefficients



The full hyetograph for the 3-hour duration 1% AEP event is compared to the net hyetograph produced by the SCS-CN method, and the 1% AEP net hyetograph produced assuming a runoff coefficient of 0.66 (representing the average runoff rate within the model domain produced by the WetSpa methodology described in Liu and Smedt, 2004) in Figure 6.4 below.

Figure 6.4 Comparison of net rainfall hyetographs produced by the SCS-CN and spatially varying runoff approaches



The two methodologies produce broadly similar net hyetographs. The SCS-CN approach accounts for greater initial losses, though produces a slightly greater peak rainfall intensity. However, whilst the method is widely accepted and applicable globally to provide runoff estimates, it is typically considered overly simplistic. The validity of the initial abstraction coefficient and ability of a single CN value to characterise the runoff response of a watershed correctly are widely scrutinised. For these reasons, the spatially varying runoff coefficient is considered a more appropriate representation for this study, with runoff rates varying between 0.57 and 0.82 dictated by the underlying slope, soil, and land-cover.

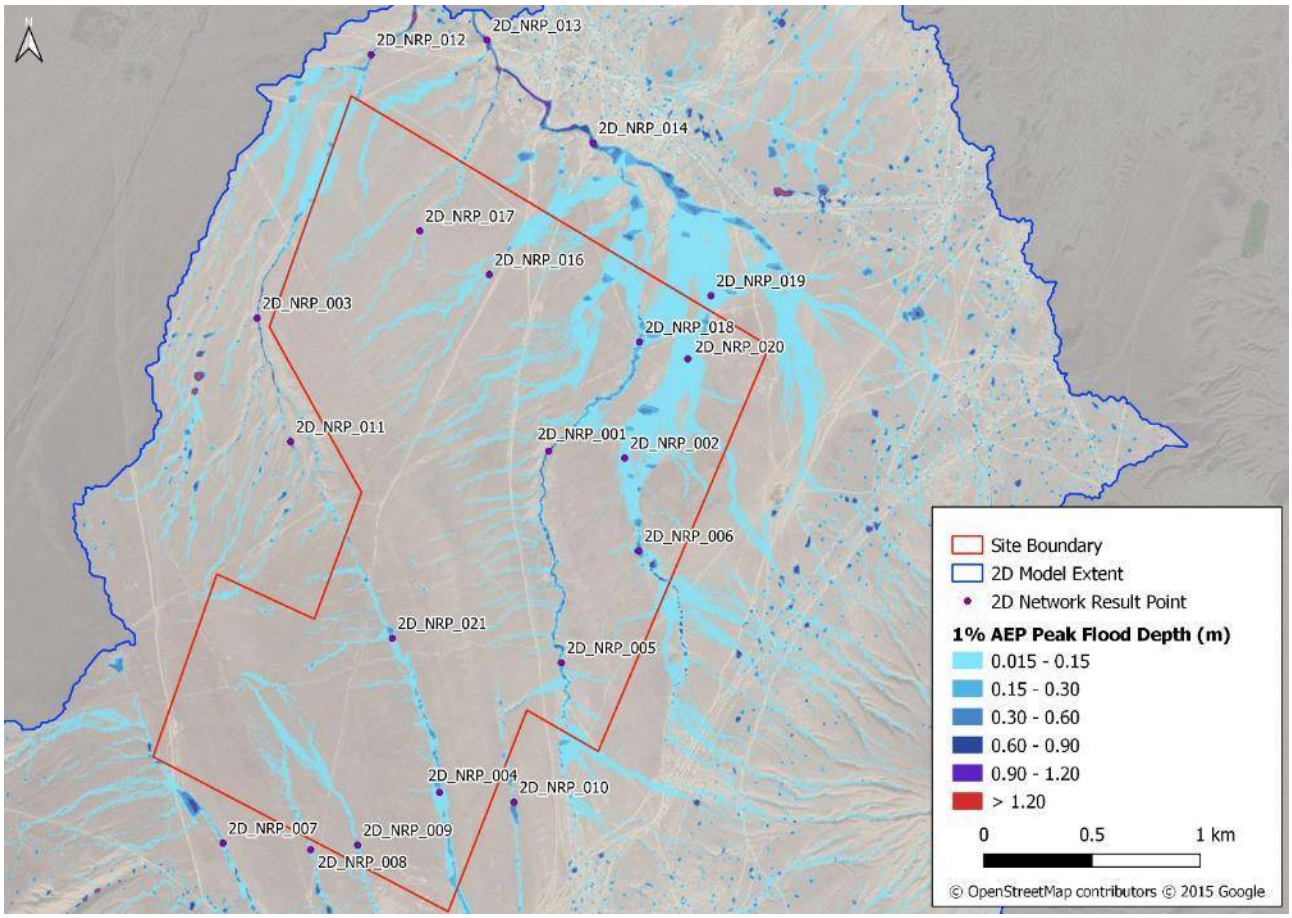
6.4 Model results summary

The results of the hydraulic modelling are presented in the following sub-sections, detailing the maximum flood depths and velocities for each of the design storm events considered: 10% AEP, 4% AEP, 2% AEP, and 1% AEP.

Flood depths

Modelled peak flood depths for the 1% AEP event at the Project site are shown in Figure 6.5, in addition to the 2D network result points. The flood depth results have been classified such that only flood depths of >0.015m are displayed. The full suite of flood depth results for all AEP events are displayed in Figure 6.5.

Figure 6.5 1% AEP maximum flood depths and result point locations



The model depth results distinguish several key flowpaths intersecting the Project site, in line with the drainage analysis described in Section 4.2. The predicted flood depths are consistent with the expected response to rainfall events, with greatest peak flood depths predicted within the entrenched channel networks which drain the Project site. Flood extents (>0.015m) are generally well distinguished and confined to the channel networks, however, a region of extensive shallow (<0.15m) flooding is indicated in the north-east portion of the Project where several channel networks open out onto a region of shallower gradient.

Peak depths of up to 0.60 to 0.90m in the 1% AEP event are anticipated in isolated locations on the main drainage flowpaths within the Project site. Peak flood depths are typically shallow (<0.15 m) elsewhere across the majority of the Project area for all AEP events.

As expected, peak flood depths and extents increase as the AEP decrease, and show the varying significance of flowpaths across each AEP. Extracted peak flood depths for result point locations shown in Figure 6.5 across all event AEPs are detailed in Table 6.3 below.

Table 6.3 Maximum flood depths at result point locations across the Site

	Peak flood depth (m)			
Results Point	**10% AEP**	**4% AEP**	**2% AEP**	**1% AEP**
2D_NRP_001	0.59	0.64	0.68	0.71
2D_NRP_002	0.05	0.06	0.07	0.07
2D_NRP_003	0.34	0.39	0.41	0.45
2D_NRP_004	0.08	0.09	0.09	0.10
2D_NRP_005	0.08	0.09	0.10	0.10
2D_NRP_006	0.36	0.39	0.41	0.44
2D_NRP_007	0.31	0.34	0.35	0.36
2D_NRP_008	0.06	0.07	0.08	0.08
2D_NRP_009	0.23	0.24	0.24	0.25
2D_NRP_010	0.34	0.37	0.39	0.40
2D_NRP_011	0.50	0.52	0.53	0.54
2D_NRP_012	0.29	0.33	0.36	0.38
2D_NRP_013	0.33	0.40	0.45	0.50
2D_NRP_014	0.53	0.60	0.65	0.69
2D_NRP_016	0.03	0.04	0.05	0.05
2D_NRP_017	0.06	0.07	0.08	0.08
2D_NRP_018	0.21	0.23	0.24	0.25
2D_NRP_019	0.07	0.08	0.09	0.09
2D_NRP_020	0.05	0.05	0.06	0.07
2D_NRP_021	0.07	0.09	0.09	0.10

Note: Network results point '2D_NRP_015' has been omitted. Results are reported to 2 decimal places.

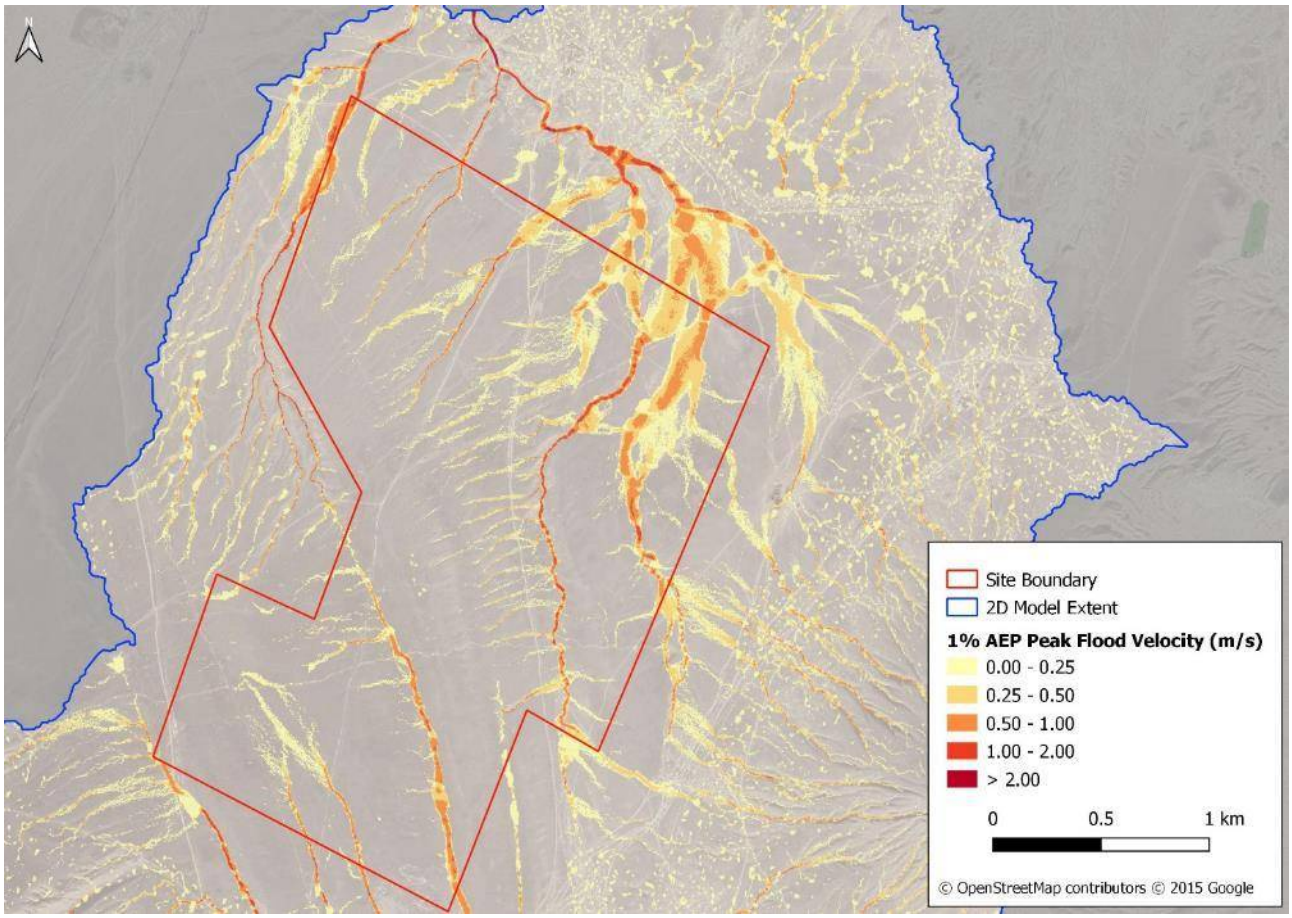
The modelled peak depth results indicate flood water ponding in areas outside of the topographical survey extent as a consequence of the underlying wider AW3D DSM. This wider elevation model has numerous widespread minor depressions across the topographic surface which prevent a smooth continuous flowpath as modelled within the topographical survey extent. The impact of this upon the validity of the results is anticipated to be low since this is typically observed on flowpaths draining away from and outside of the proposed Project site extent.

However, several flowpaths are shown to originate from the mud volcano in the south-east of the model domain and flow north across the Project area as evidenced by the drainage analysis detailed in Section 4.2 and Figure 4.5. The model results predict widespread ponding of water within the wider DSM on this flowpath at the base of the volcano, which could potentially be underestimating the modelled peak flood depth results further downstream across the Project site. However, analysis of satellite imagery in combination with the topographic data suggests an alluvial fan feature in this location, with numerous possible flow routes both to the north and south. Since the drainage analysis is based on an edited 'Hydro DEM'; whereby depressions and sinks are filled to allow a continuous flowpath to be modelled, the resulting drainage lines may not always provide a true reflection of reality where widespread edits are required to enforce a modelled flow route. Therefore, the observed ponding of water on this flowpath is not considered to have a significant impact on the validity of the modelled flood results across the Project site, since only a portion of this water is expected to flow onto the project site in reality.

Flow velocities

The distribution of the peak flow velocities across the Site for the 1% AEP event is shown in Figure 6.6 below. Flow velocities have been categorised such that only flows with depths >0.015m are shown in accordance with the peak depth results shown in Figure 6.5 above. Peak flow velocities for all AEP events are displayed in Appendix C.

Figure 6.6 1% AEP maximum flood velocities



As anticipated, the maximum flow velocities occur along the main flowpaths identified in Figure 6.5, reflecting the incised nature of the drainage channels. Peak flow velocities are seen to increase in magnitude with decreasing AEP. Peak flow velocities within the entrenched flowpath channels are typically in the magnitude of 1 to 2m/s across all events, with some localised regions where flows exceed 2m/s. Across the shallower and upstream minor flowpaths the flow velocities are typically low, below 0.50m/s.

6.5 Sensitivity testing

The objective of the sensitivity testing is to highlight the degree of change associated with the adjustment of an input in order to provide confidence that the values chosen for final runs are based on valid assumptions.

Sensitivity tests have been carried on the hyetograph profile, manning's n surface roughness coefficient, rainfall-runoff coefficient and the topographic join. These are discussed in sub-sections below.

Hyetograph profile

The baseline model has been run using a Huff fourth quartile (Q4) profile. The Q4 corresponds to the fact that the maximum rainfall intensity lies in the fourth quartile of the event duration. This is typically considered to be a conservative approach, since the highest rainfall intensity will be occurring when the topographic surface within the model is already wet and surface storage capacity is minimised. However, the sensitivity of the model to the hyetograph profile has been assessed to provide confidence in the Q4 profile selected.

The baseline model has been run with additional Q1 (first quartile), Q2 (second quartile) and Q3 (third quartile) hyetographs of 1% AEP and 3-hour duration. Resulting peak depths recorded across the 2D network result points shown in Figure 6.5 are outlined in Table 6.4 below with comparison to the Q4 peak depths.

Table 6.4 Runoff coefficient sensitivity results

	Peak Depth (m)			
Results Point	**Q1**	**Q2**	**Q3**	**Q4**
2D_NRP_001	0.66	0.65	0.68	0.71
2D_NRP_002	0.06	0.06	0.07	0.07
2D_NRP_003	0.37	0.37	0.40	0.45
2D_NRP_004	0.09	0.08	0.09	0.10
2D_NRP_005	0.09	0.08	0.09	0.10
2D_NRP_006	0.39	0.41	0.43	0.44
2D_NRP_007	0.33	0.34	0.35	0.36
2D_NRP_008	0.08	0.06	0.07	0.08
2D_NRP_009	0.24	0.24	0.24	0.25
2D_NRP_010	0.39	0.39	0.40	0.40
2D_NRP_011	0.51	0.51	0.52	0.54
2D_NRP_012	0.33	0.33	0.36	0.38
2D_NRP_013	0.44	0.46	0.49	0.50
2D_NRP_014	0.63	0.64	0.68	0.69
2D_NRP_016	0.04	0.04	0.04	0.05
2D_NRP_017	0.08	0.06	0.07	0.08
2D_NRP_018	0.24	0.23	0.25	0.25
2D_NRP_019	0.08	0.08	0.09	0.09
2D_NRP_020	0.06	0.06	0.06	0.07
2D_NRP_021	0.09	0.08	0.09	0.10

Note: Network results point '2D_NRP_015' has been omitted. Results are reported to 2 decimal places, and highlighted results indicate peak depths.

Peak depth results recorded across the model domain consistently report peak depths associated with the Q4 profile. Consequently, it can be concluded that applying the Huff Q4 hyetograph profile provides the most conservative and 'worst-case' scenario and is therefore justified for this assessment.

Manning's n roughness coefficient

The baseline manning's n roughness values applied to the hydraulic model have been chosen based on available information on the land-use, modeller experience and judgement. Baseline roughness values have been adjusted to represent the reasonable upper (SS1) and lower bounds (SS2) for each associated land-use to test the sensitivity of the model to this parameter. Changes to manning's n are detailed in Table 6.5 below.

Table 6.5 Manning's n roughness coefficient sensitivity test schematisation

	Roughness coefficient (Manning's n)		
Land-cover	**Baseline**	**SS1**	**SS2**
Buildings	0.300	0.500	0.100
Tracks	0.020	0.030	0.015
Water	0.040	0.045	0.025
Sparse vegetation <15%	0.025	0.030	0.017
Shrubland	0.050	0.070	0.035
Bare areas	0.020	0.025	0.015
Urban	0.017	0.025	0.013

The model has been run using the 1% AEP 3-hour duration Huff Q4 hyetograph, and the results analysed across the 2D network result points shown in Table 6.6 with respect to the baseline.

Table 6.6 Manning's n roughness coefficient sensitivity results

Results Point	Baseline peak flood depth (m)	SS1 peak flood depth (m)	Difference (m)
2D_NRP_001	0.71	0.72	+0.01
2D_NRP_002	0.07	0.08	+0.00
2D_NRP_003	0.45	0.45	+0.01
2D_NRP_004	0.10	0.11	+0.01
2D_NRP_005	0.10	0.11	+0.01
2D_NRP_006	0.44	0.45	+0.01
2D_NRP_007	0.36	0.37	+0.01
2D_NRP_008	0.08	0.08	+0.00

Results Point	Baseline peak flood depth (m)	SS1 peak flood depth (m)	Difference (m)
2D_NRP_009	0.25	0.25	+0.00
2D_NRP_010	0.40	0.40	+0.00
2D_NRP_011	0.54	0.54	+0.00
2D_NRP_012	0.38	0.39	+0.01
2D_NRP_013	0.50	0.56	+0.05
2D_NRP_014	0.69	0.70	+0.01
2D_NRP_016	0.05	0.05	+0.00
2D_NRP_017	0.08	0.09	+0.01
2D_NRP_018	0.25	0.25	+0.00
2D_NRP_019	0.09	0.10	+0.00
2D_NRP_020	0.07	0.07	+0.00
2D_NRP_021	0.10	0.10	+0.01

Results Point	Baseline peak flood depth (m)	SS2 peak flood depth (m)	Difference (m)
2D_NRP_001	0.71	0.70	0.00
2D_NRP_002	0.07	0.07	-0.01
2D_NRP_003	0.45	0.45	0.01
2D_NRP_004	0.10	0.08	-0.02
2D_NRP_005	0.10	0.08	-0.02
2D_NRP_006	0.44	0.43	-0.01
2D_NRP_007	0.36	0.35	-0.01
2D_NRP_008	0.08	0.07	-0.01
2D_NRP_009	0.25	0.25	0.00
2D_NRP_010	0.40	0.40	0.00
2D_NRP_011	0.54	0.54	0.00
2D_NRP_012	0.38	0.37	-0.01

Results Point	Baseline peak flood depth (m)	SS1 peak flood depth (m)	Difference (m)
2D_NRP_013	0.50	0.45	-0.06
2D_NRP_014	0.69	0.70	0.01
2D_NRP_016	0.05	0.05	0.00
2D_NRP_017	0.08	0.07	-0.02
2D_NRP_018	0.25	0.26	0.00
2D_NRP_019	0.09	0.09	0.00
2D_NRP_020	0.07	0.06	-0.01
2D_NRP_021	0.10	0.09	-0.01

Note: Network results point '2D_NRP_015' has been omitted. Results are reported to 2 decimal places.

The model performs as expected, with increased flood depths reported in SS1 in response to increased roughness coefficients, and reduced flood depths reported in SS2 associated with a reduction in roughness coefficients. Variance of up to +0.05m is reported in SS1, and up to -0.06m in SS2. In both cases, the greatest divergence was seen at result point 013 at the northern extent of the model. Variances in peak flood depths reported across the Project site was limited to +/- 0.02m. The baseline manning's n coefficients are therefore justified, given the relatively minor impact to peak flood depths.

Runoff coefficient

The runoff coefficients across the model extent have been delineated based on slope, soil texture and land-cover as outlined in Section 6.3. The sensitivity of the model to this parameter has been assessed, adjusting the coefficient by +20% (SS3) and -20% (SS4) to account for the potential variability in landcover (that appears largely ephemeral) and soil texture, the latter of which has been defined solely on the basis of a coarse global dataset.

The model has been run using the 1% AEP 3-hour duration Huff Q4 hyetograph, and the results analysed across the 2D network result points shown in Table 6.7 with respect to the baseline.

Table 6.7 Runoff coefficient sensitivity results

Results Point	Baseline peak flood depth (m)	SS3 peak flood depth (m)	Difference (m)
2D_NRP_001	0.71	0.77	+0.06
2D_NRP_002	0.07	0.09	+0.02
2D_NRP_003	0.45	0.52	+0.07
2D_NRP_004	0.10	0.11	+0.01
2D_NRP_005	0.10	0.12	+0.02

Results Point	Baseline peak flood depth (m)	SS3 peak flood depth (m)	Difference (m)
2D_NRP_006	0.44	0.49	+0.05
2D_NRP_007	0.36	0.39	+0.02
2D_NRP_008	0.08	0.09	+0.01
2D_NRP_009	0.25	0.26	+0.01
2D_NRP_010	0.40	0.42	+0.02
2D_NRP_011	0.54	0.56	+0.03
2D_NRP_012	0.38	0.43	+0.05
2D_NRP_013	0.50	0.63	+0.13
2D_NRP_014	0.69	0.78	+0.09
2D_NRP_016	0.05	0.06	+0.01
2D_NRP_017	0.08	0.09	+0.01
2D_NRP_018	0.25	0.27	+0.02
2D_NRP_019	0.09	0.11	+0.02
2D_NRP_020	0.07	0.08	+0.01
2D_NRP_021	0.10	0.11	+0.01

Results Point	Baseline peak flood depth (m)	SS4 peak flood depth (m)	Difference (m)
2D_NRP_001	0.71	0.64	-0.07
2D_NRP_002	0.07	0.06	-0.02
2D_NRP_003	0.45	0.38	-0.06
2D_NRP_004	0.10	0.08	-0.01
2D_NRP_005	0.10	0.09	-0.02
2D_NRP_006	0.44	0.38	-0.06
2D_NRP_007	0.36	0.33	-0.03
2D_NRP_008	0.08	0.07	-0.01
2D_NRP_009	0.25	0.24	-0.01

Results Point	Baseline peak flood depth (m)	SS3 peak flood depth (m)	Difference (m)
2D_NRP_010	0.40	0.37	-0.03
2D_NRP_011	0.54	0.51	-0.02
2D_NRP_012	0.38	0.33	-0.05
2D_NRP_013	0.50	0.40	-0.11
2D_NRP_014	0.69	0.60	-0.09
2D_NRP_016	0.05	0.04	-0.01
2D_NRP_017	0.08	0.07	-0.01
2D_NRP_018	0.25	0.23	-0.02
2D_NRP_019	0.09	0.08	-0.02
2D_NRP_020	0.07	0.05	-0.01
2D_NRP_021	0.10	0.08	-0.01

Note: Network results point '2D_NRP_015' has been omitted. Results are reported to 2 decimal places.

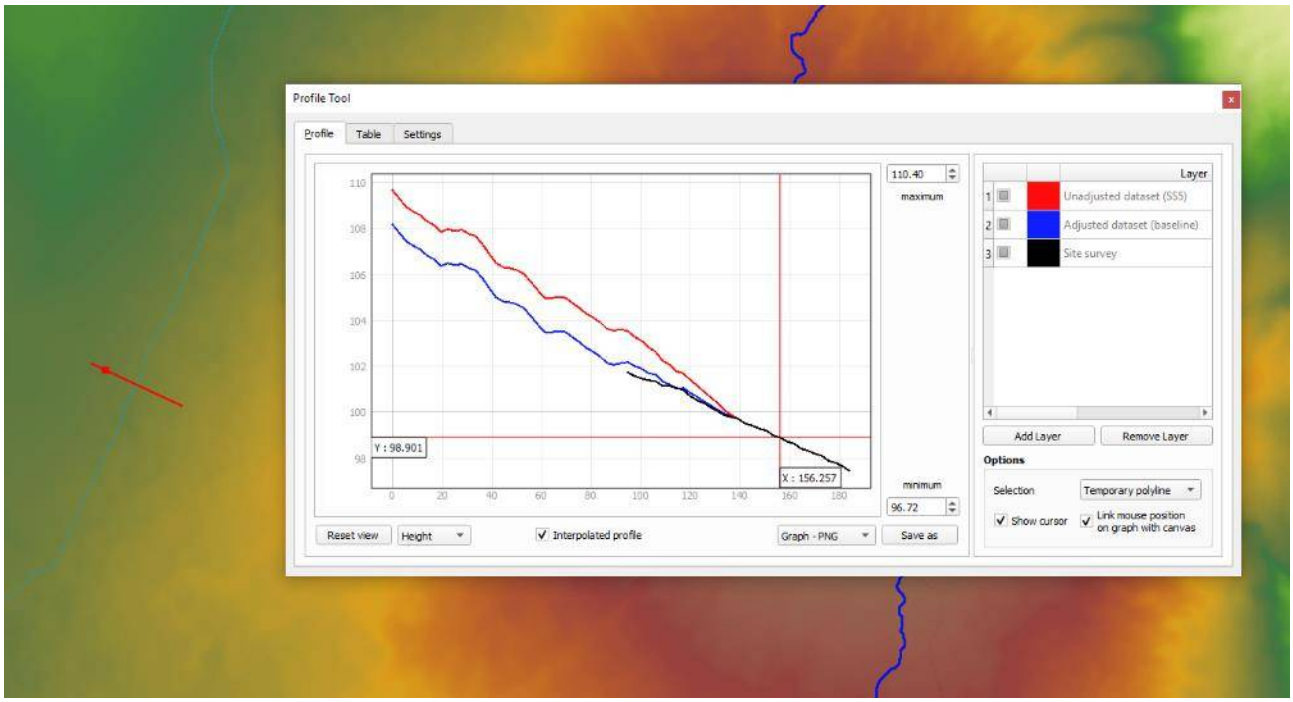
In response to an increased rainfall runoff coefficient in SS3, peak flood depths reported across the 2D network result points increase as expected. Peak flood depth increases of up to 0.06m are reported across the result points within the Project site, whilst increases of up to 0.13m are recorded at result point 013 on the main flowpath draining north of the Project site.

Peak flood depth reductions of between 0.01m and 0.05m are reported across the Site in response to a reduction in the rainfall runoff coefficients. Similarly, the greatest impact is observed at result point 013 with a reduction of 0.11m in peak flood depth.

Topography

As discussed in Section 4.1, the wider AW3D DEM was adjusted to account for the average discrepancy between the two datasets to improve the join boundary since there was strong evidence for a datum shift. The sensitivity of the model to this assumption was assessed, by running the model with an 'unadjusted' (raw) AW3D DEM in combination with the Project site survey data (SS5). The two datasets were joined using the same method with a blending distance of 50m. Figure 6.7 below shows a typical topographic profile across the join boundary (red line), displaying the Project site survey data (black), the adjusted AW3D DEM combined dataset as used in the baseline modelling (blue), and the unadjusted AW3D DEM combined dataset as used in this sensitivity test (red). The profile shows that the adjusted AW3D DEM typically provides greatest alignment at the join boundary.

Figure 6.7 Topographic join boundary profile



The model has been run using the 1% AEP 3-hour duration Q4 hyetograph. Table 6.8 below outlines the reported 2D peak depth results across the model domain with respect to the baseline. Peak depth results reported across the Project site show variance of up to +0.10m. At result points outside of the Project site, peak depth results vary from -0.05m to +0.34m at result point 013, however, this point should be ignored since it is situated within the blending boundary at the edge of the survey extent.

Table 6.8 Topography sensitivity test results

Results Point	Baseline peak flood depth (m)	SS5 peak flood depth (m)	Difference (m)
2D_NRP_001	0.71	0.81	+0.10
2D_NRP_002	0.07	0.07	-0.00
2D_NRP_003	0.45	0.45	+0.01
2D_NRP_004	0.10	0.10	+0.00
2D_NRP_005	0.10	0.09	-0.02
2D_NRP_006	0.44	0.43	-0.01
2D_NRP_007	0.36	0.40	+0.04
2D_NRP_008	0.08	0.08	+0.00
2D_NRP_009	0.25	0.25	-0.00

Results Point	Baseline peak flood depth (m)	SS5 peak flood depth (m)	Difference (m)
2D_NRP_010	0.40	0.43	+0.03
2D_NRP_011	0.54	0.54	+0.00
2D_NRP_012	0.38	0.33	-0.05
2D_NRP_013	0.50	0.85	+0.34
2D_NRP_014	0.69	0.69	-0.00
2D_NRP_016	0.05	0.06	+0.01
2D_NRP_017	0.08	0.10	+0.02
2D_NRP_018	0.25	0.36	+0.11
2D_NRP_019	0.09	0.09	-0.00
2D_NRP_020	0.07	0.07	-0.00
2D_NRP_021	0.10	0.10	-0.00

Note: Network results point '2D_NRP_015' has been omitted. Results are reported to 2 decimal places.

The results indicate that the peak flood depth results are relatively insensitive to the topographic join. However, some flowpaths intersecting the Project site report an increase in peak flood depths, as one may expect given the steeper gradient at the join boundary and potential acceleration of flood flows. In particular, this is noticeable on flowpaths originating from the south-east of the Project site and flowing north-west, as reported at result points 001 and 018. However, given the strong evidence for a datum shift between the two datasets as evident in Figure 6.7 above, the baseline flood results are expected to provide the greatest degree of confidence.

7. Conclusions and recommendations

7.1 Flood risk summary

A broad scale 2D direct rainfall modelling approach has been employed to provide an overview assessment of flood risk across the proposed Project site. The modelling outputs have demonstrated that the majority of the Project site is typically at low risk of flooding, with predominantly shallow (<0.15m) peak flood depths. The greatest flood risk, both in terms of depth and velocity, is anticipated within the entrenched drainage channels that drain the Project site area flowing north and south-east, whilst an extensive region of shallow water flooding is anticipated in the north-east portion of the Project site across all AEP flood events.

The modelling approach employed in this study has been developed on the basis of commercially available terrain data to supplement the detailed topographic Project site survey data. This is considered appropriate to provide an overall indication of the distribution and severity of flood risk across the site for the purposes of optimising the Project site layout to avoid areas of high flood risk.

The model results summary in Section 6.4 highlighted the issue of extensive ponded water across the model where the wider AW3D has been utilised, which may be leading to an underestimation of floodwater across the Project site. However, as previous discussed this upstream ponding in the wider terrain is not considered to have a significant impact on the validity of the modelled flood results across the Site. An extension of the Project site topographic survey to include the upstream catchment contributing to the site would provide more accurate estimates of flood levels and velocities and confidence if required for the design of watercourse crossings and flood resilience measures in the future.

7.2 Recommendations for managing flood risk

A hierarchy of mitigation measures is recommended as follows:

- Infrastructure that is most vulnerable to flooding, should be located in areas of lowest flood risk (i.e. areas of solar PV panels should be situated outside of the main flood risk corridors);
- As far as possible, access roads should be routed outside of areas of highest flood risk (noting that at some locations roads will need to cross high flood risk corridors); and
- Where this is not possible, flood mitigation measures will need to be defined as part of ongoing scheme design.

Appropriate flood mitigation and resilience measures may include:

- Hard engineering or 'flood resistance' measures, for example:
  - If access roads and watercourse crossings need to remain operational during flood events, minimum road levels and sufficient bridge/culvert conveyance should be defined with reference to an appropriate design event frequency;
  - Appropriate erosion protection measures, such as rip-rap or gabion baskets may need to be specified in areas of highest erosion risk;
- Operational or 'flood resilience' measures, for example:

a. Developing and maintaining a flood response plan for both construction and operational phases of the development, setting out the key flood risk areas, and appropriate evacuation procedures/ access restrictions, in the event that extreme rainfall is forecast;

b. Making provision for rapid recovery following flood events. For example, keeping a road grading machine on stand-by to make good any damage to access tracks following flooding.

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Appendix A
Rainfall hyetographs

Figure A.1 10% AEP Huff Q4 3-hour duration hyetograph

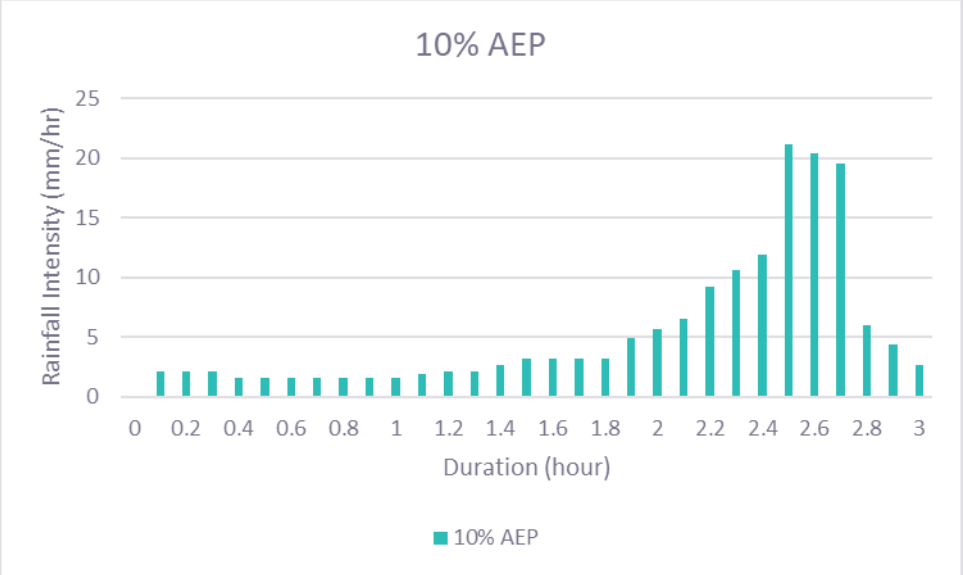


Figure A.2 4% AEP Huff Q4 3-hour duration hyetograph

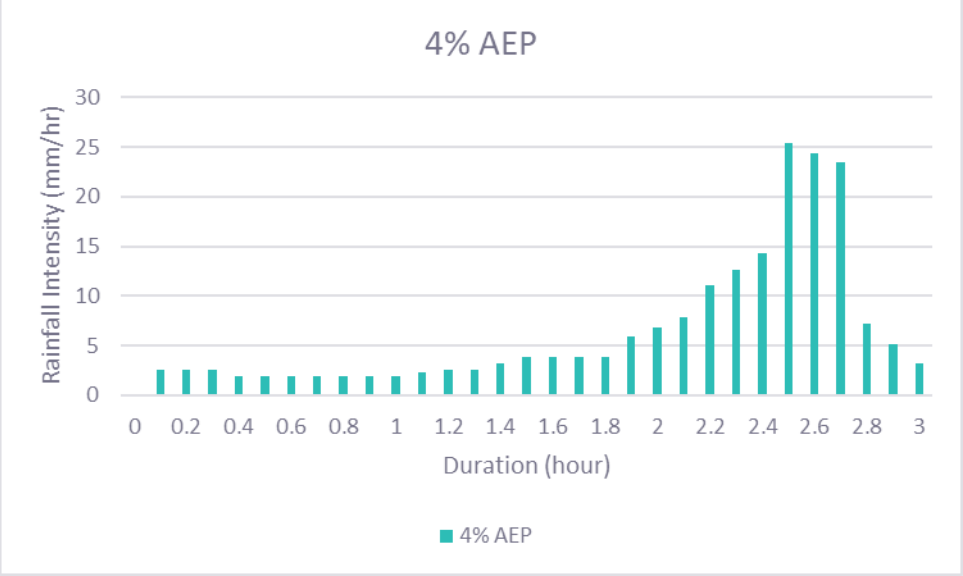


Figure A.3 2% AEP Huff Q4 3-hour duration hyetograph

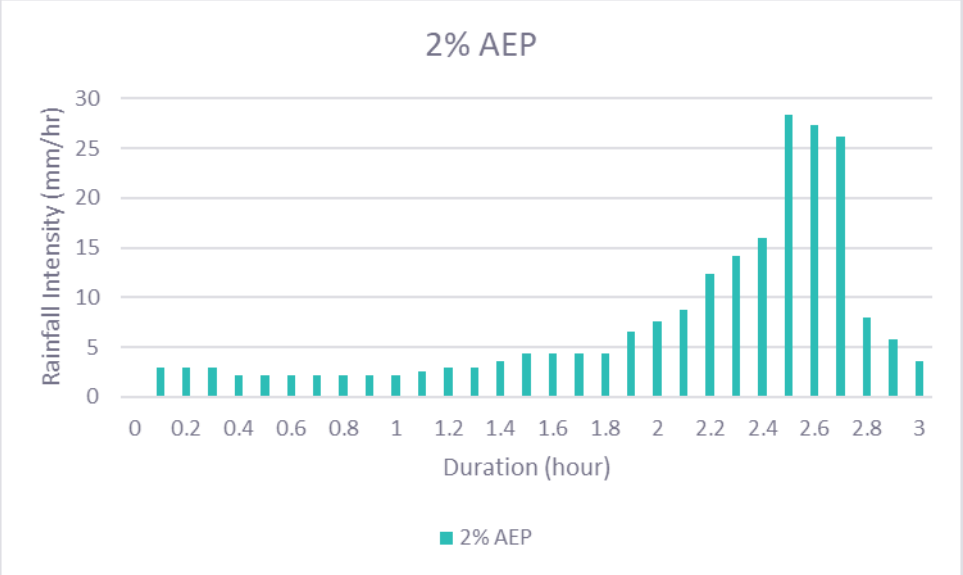
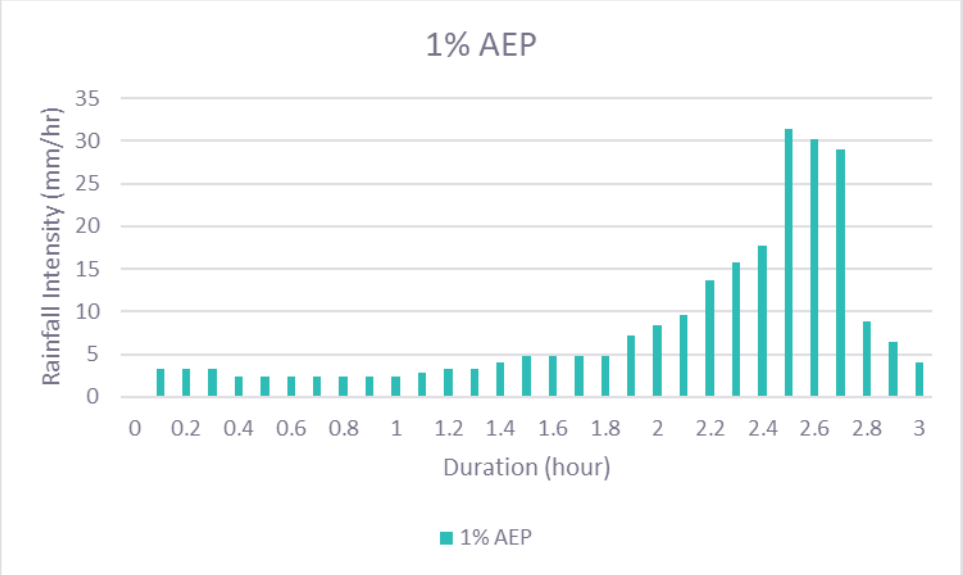
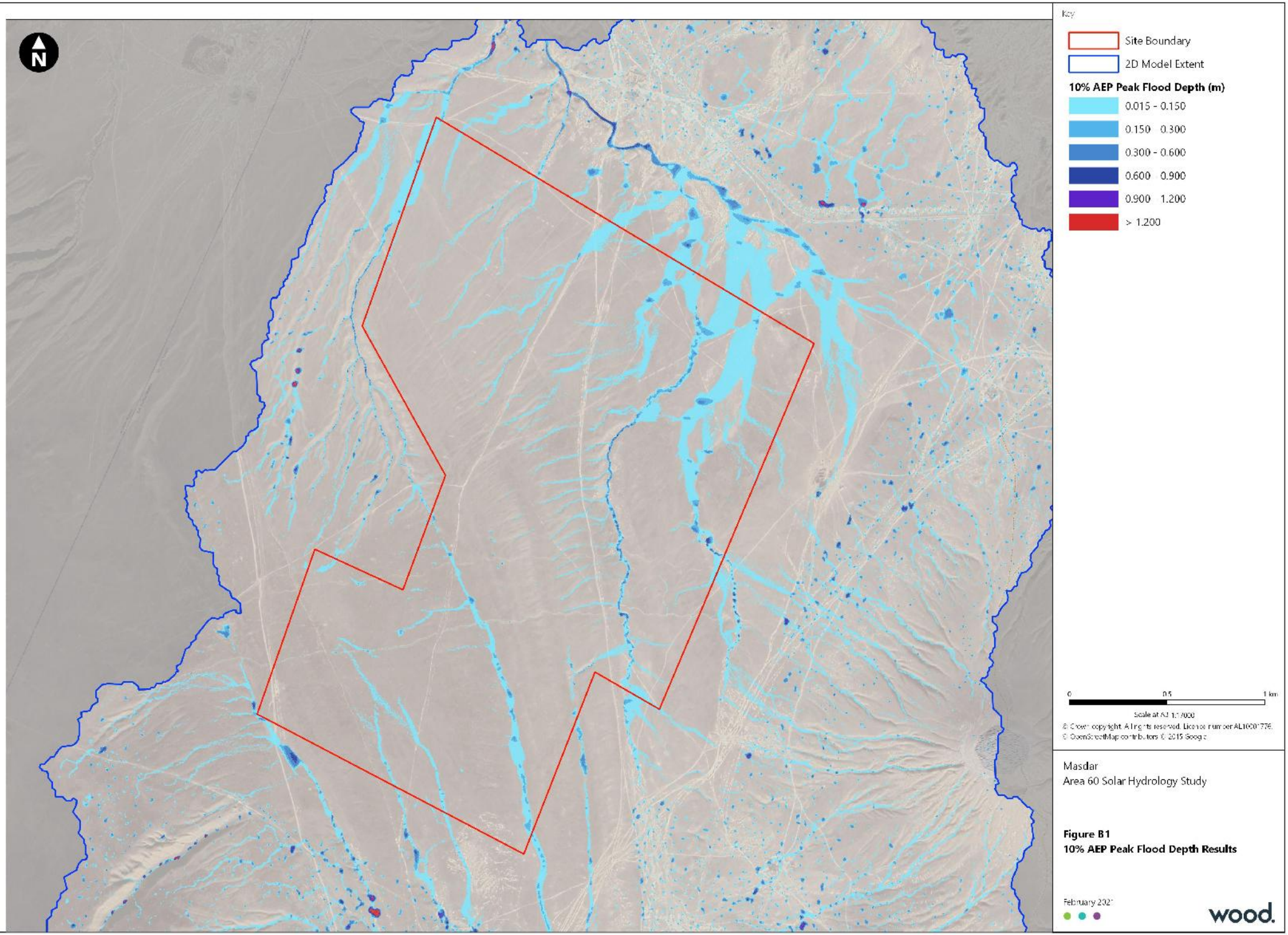


Figure A.4 1% AEP Huff Q4 3-hour duration hyetograph



Appendix B
Peak flood depth maps

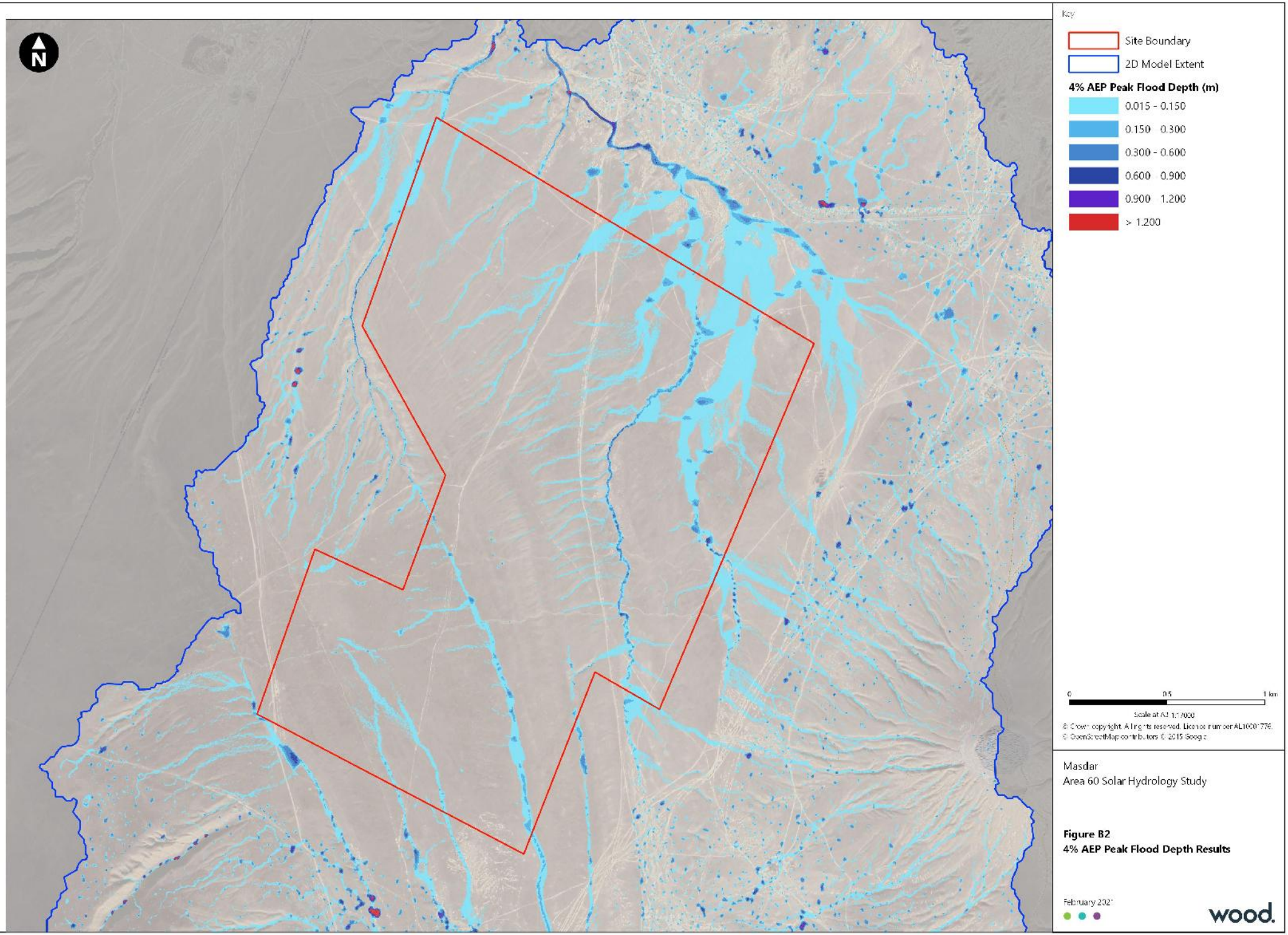


Masdar
Area 60 Solar Hydrology Study

Figure B1
10% AEP Peak Flood Depth Results

February 2021

wood.

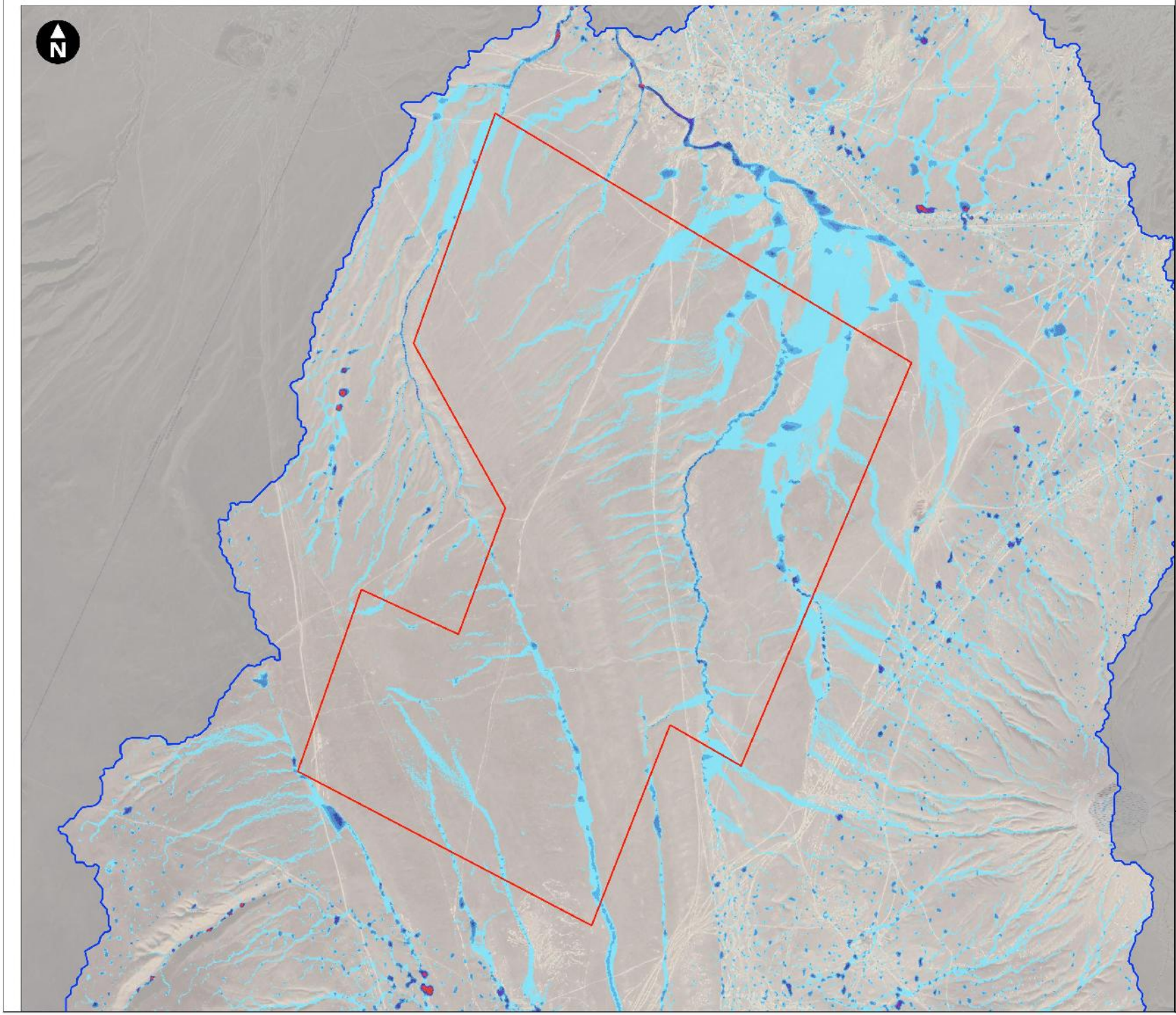


Masdar
Area 60 Solar Hydrology Study

Figure B2
4% AEP Peak Flood Depth Results

February 2021

wood.



Key

Site Boundary

2D Model Extent

2% AEP Peak Flood Depth (m)

0.015 - 0.150

0.150 - 0.300

0.300 - 0.600

0.600 - 0.900

0.900 - 1.200

> 1.200

0 0.5 1 km

Scale at A1 1:7,000

Masdar

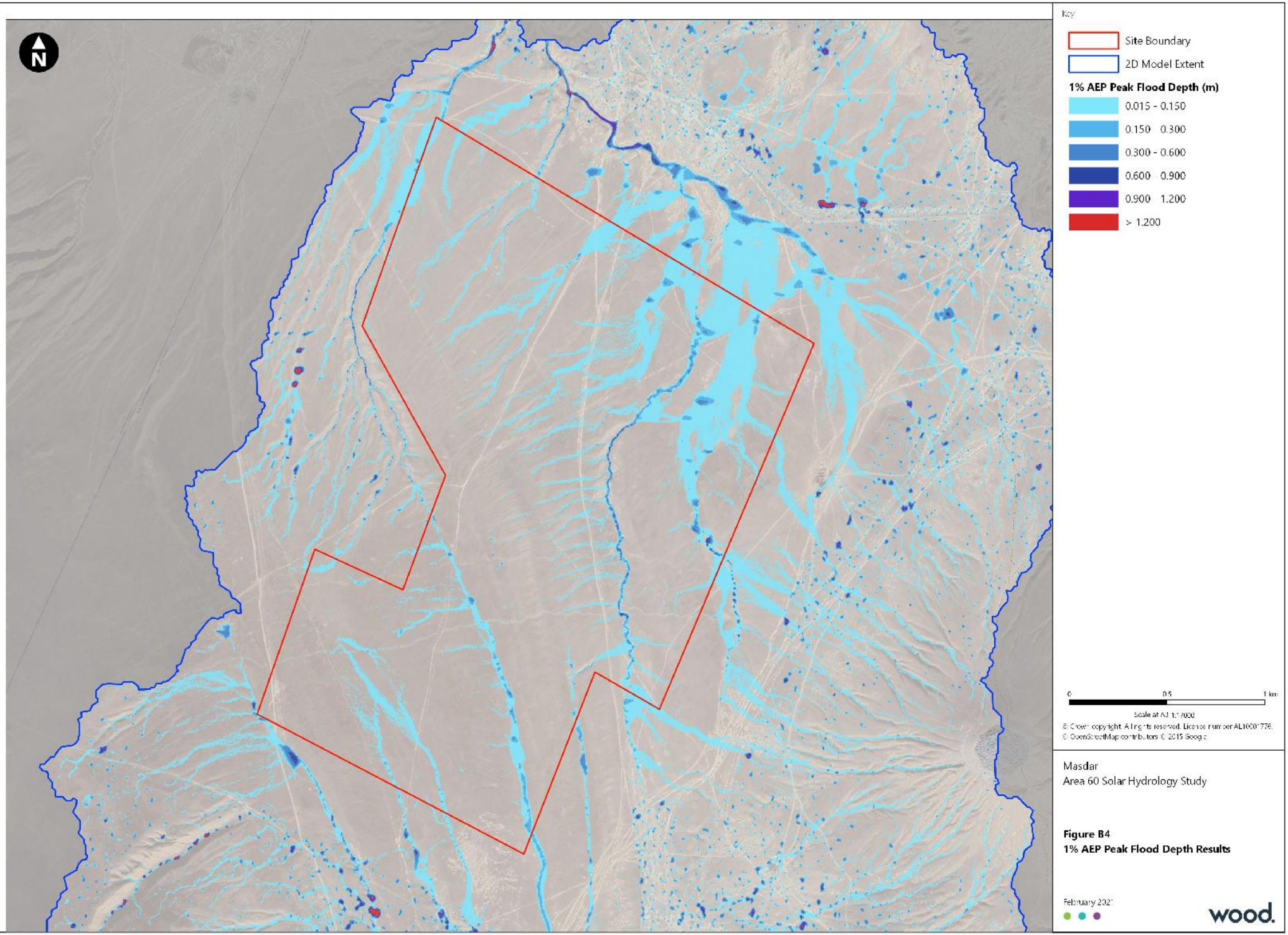
Area 60 Solar Hydrology Study

Figure B3

2% AEP Peak Flood Depth Results

February 2021

wood.



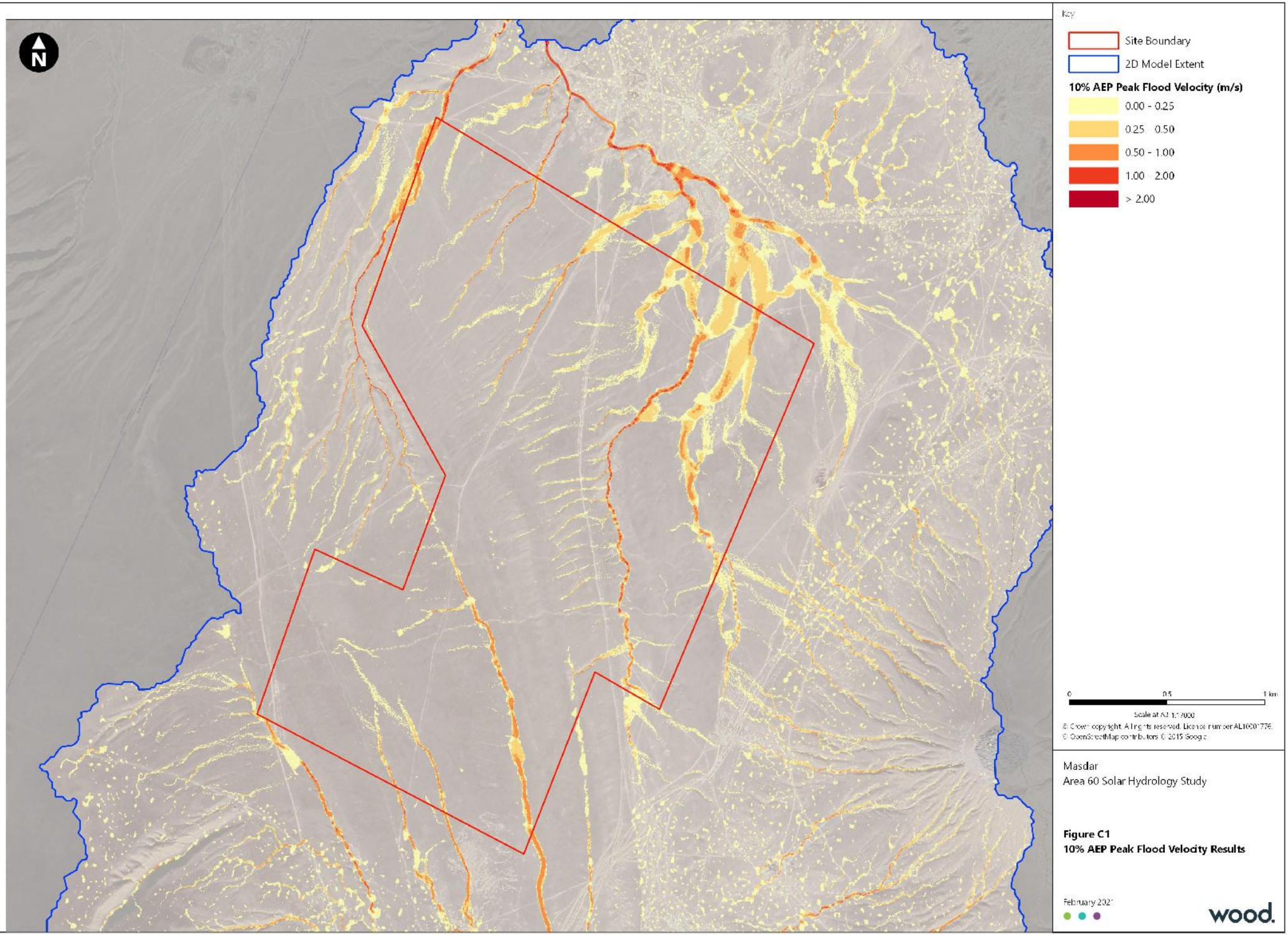
Masdar
Area 60 Solar Hydrology Study

Figure B4
1% AEP Peak Flood Depth Results

February 2021

wood.

Appendix C
Peak flood velocity maps

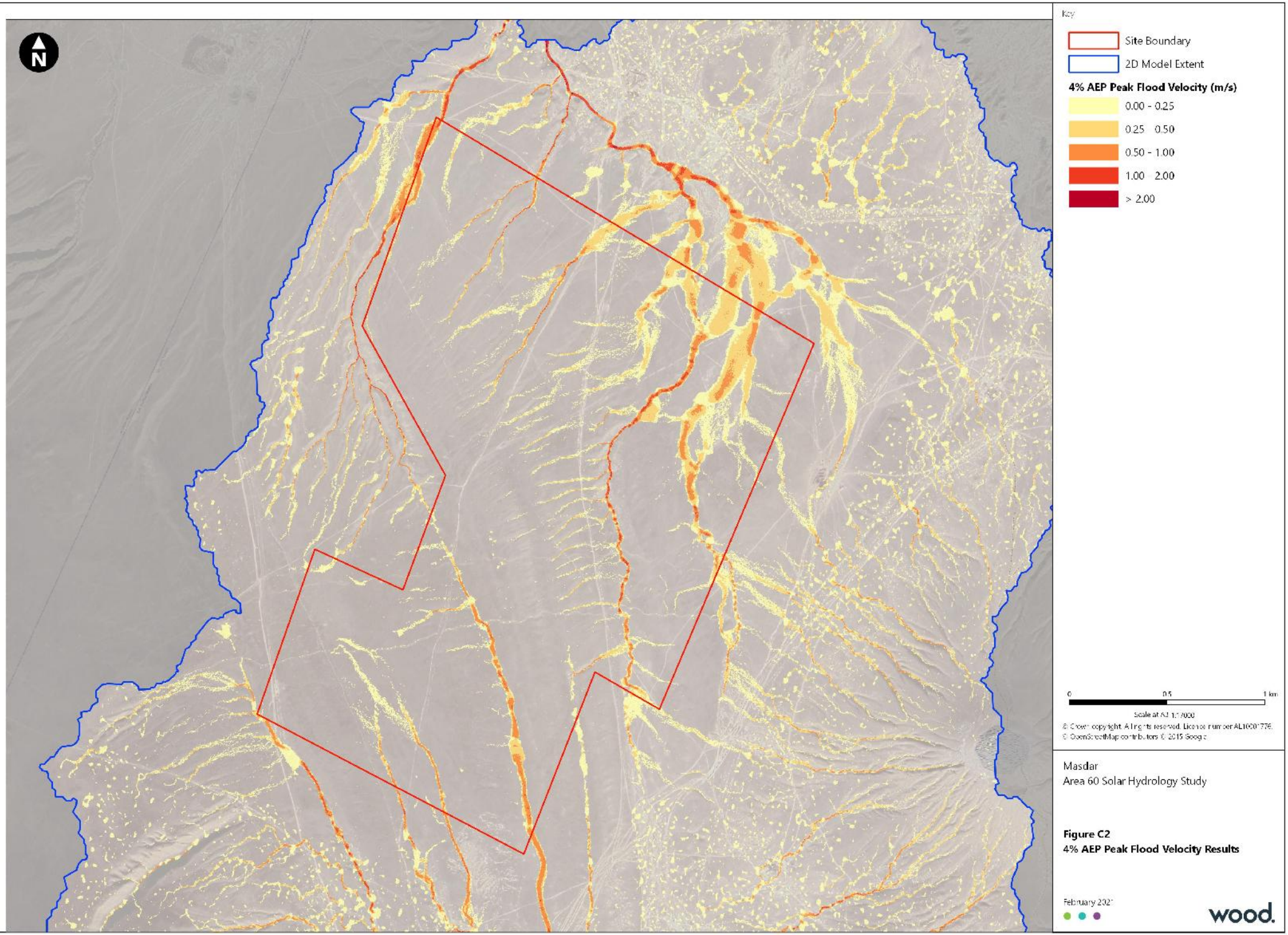


Masdar
Area 60 Solar Hydrology Study

Figure C1
10% AEP Peak Flood Velocity Results

February 2021

wood.


N
Key
Site Boundary
2D Model Extent
4% AEP Peak Flood Velocity (m/s)
0.00 - 0.25
0.25 0.50
0.50 - 1.00
1.00 2.00
> 2.00
0
0.5
1 km
Scale at A1 1:7,000
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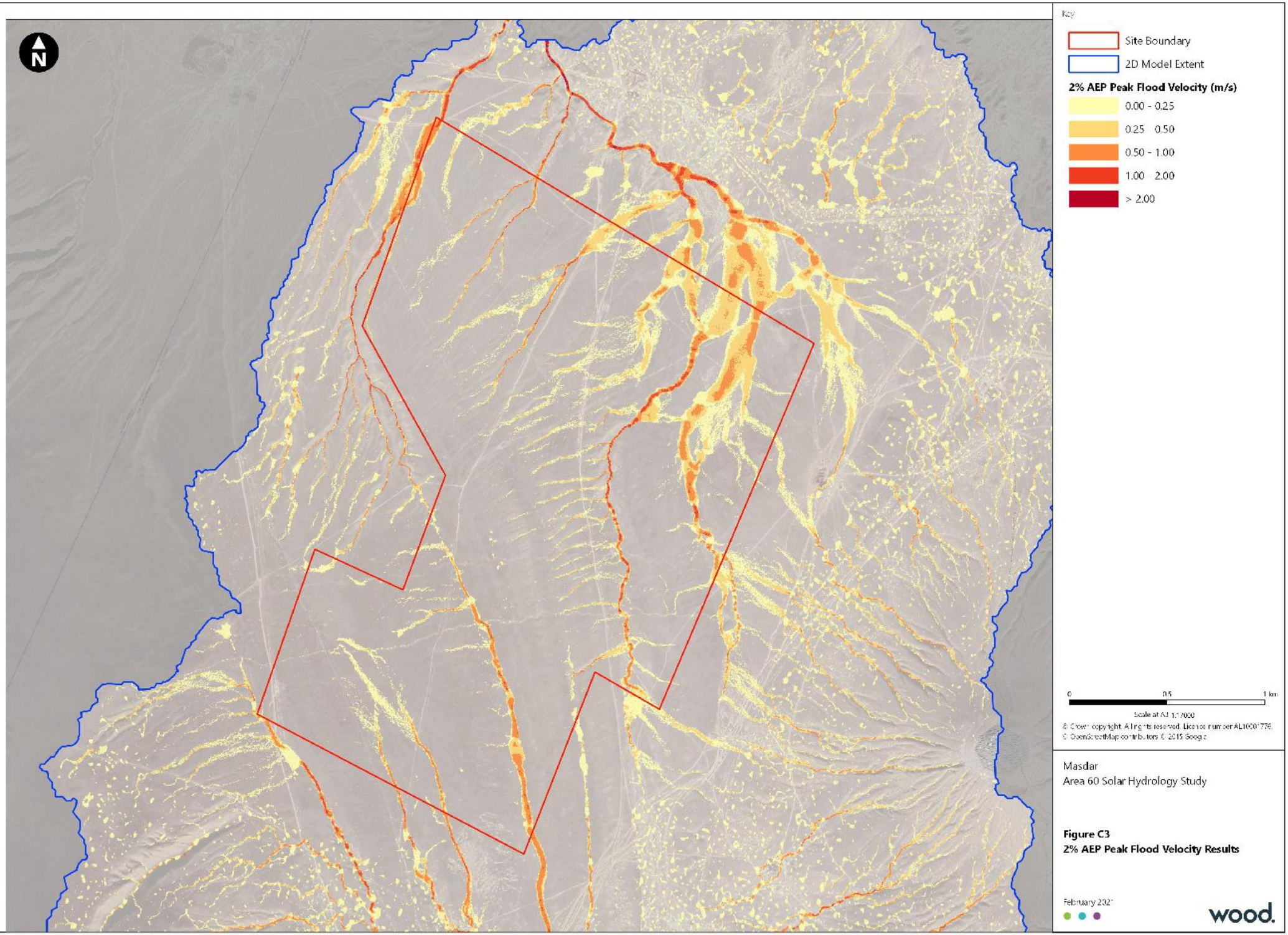
© OpenStreetMap contributors © 2015 GeoBase
Masdar
Area 60 Solar Hydrology Study
Figure C2
4% AEP Peak Flood Velocity Results
February 2021
wood.


N
Key
Site Boundary
2D Model Extent
2% AEP Peak Flood Velocity (m/s)
0.00 - 0.25
0.25 0.50
0.50 - 1.00
1.00 2.00
> 2.00
0
0.5
1 km
Scale at A1 1:7000
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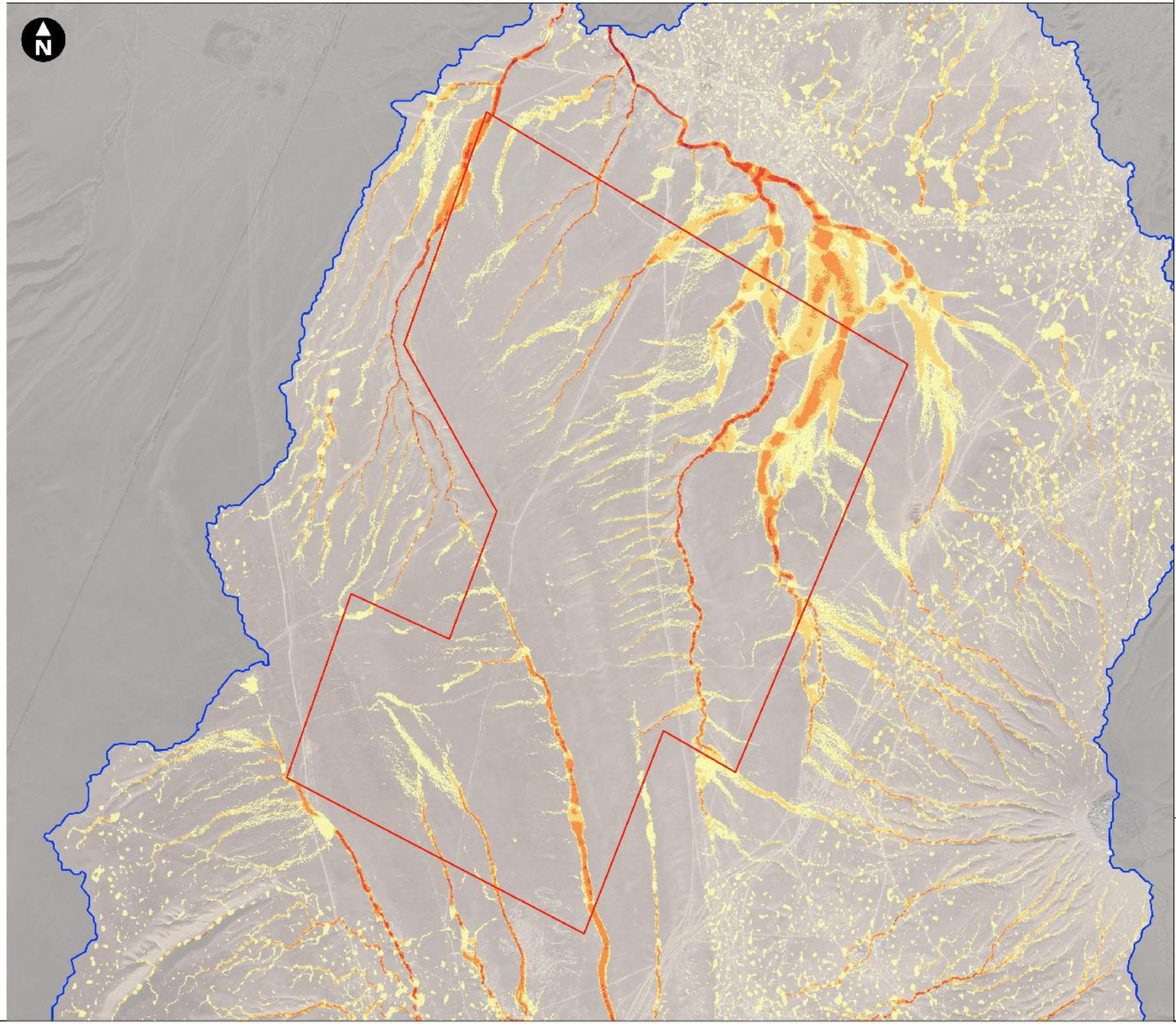
© OpenStreetMap contributors © 2015 GeoBase
Masdar
Area 60 Solar Hydrology Study
Figure C3
2% AEP Peak Flood Velocity Results
February 2021
wood.



Masdar
Area 60 Solar Hydrology Study

Figure C4
1% AEP Peak Flood Velocity Results

February 2021

wood.

Appendix G Human Rights Risk Assessment (HRRA) Scan

Human Rights Risk Assessment Scan
Area 60 Solar PV Project

14 March 2022

Final

Environmental and Social Advisory Services (ESAS) Limited

Prepared for:

Wood Group UK Ltd

Sir Ian Wood House

Altens Industrial Estate

Hareness Road, Aberdeen

AB12 3LE

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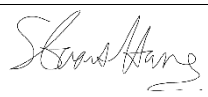
Revision History

Rev	Date	Reason for Issue	Prepared	Checked	Approved
0	21 Feb 2022	Initial release for Client review	**S Hume**	**S Hume**	**V McLean**
		Signatures		SIGNED	SIGNED
1	14 March 2022	Updated following Lender comments	**S Hume**	**S Hume**	**V McLean**
		Signatures			

Acronyms and Abbreviations

Acronym	Description
EP	Equator Principle
ESAS	Environmental and Social Advisory Services Limited
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
GIS	Geographic Information System
HRRA	Human Rights Risk Assessment
LRP	Livelihood Restoration Plan
MW	Mega Watt
NGO	Non-Governmental Organisation
OHL	Overhead Transmission Line
SEP	Stakeholder Engagement Plan

1 Introduction

This Human Rights Risk Assessment (HRRA) has been prepared by Environmental and Social Advisory Services Limited (ESAS) for Wood for a proposed 230 MW Solar Photo Voltaic (PV) Power Project in Azerbaijan (the 'Project'). The Project is being developed by the Special Purpose Vehicle (SPV) 'Masdar Azerbaijan Energy' which is a Limited Liability Company established under the laws of the Republic of Azerbaijan, whose registered address is at 43, Mammad Araz Street, Narimanov District, Baku, AZ1106, Republic of Azerbaijan.

The Equator Principles Association recognises that financial institutions and their clients have a responsibility to respect Human Rights. Equator Principles Financial Institutions ("EPFIs") demonstrate this in line with the United Nations Guiding Principles on Business and Human Rights ("UNGPs") by carrying out Human Rights due diligence on the projects EPFIs finance.

The UNGPs serve as the global authoritative framework for defining the corporate responsibility to respect Human Rights and for carrying out due diligence to prevent and address abuses. The UNGPs state that governments have the duty to protect Human Rights, including from harms committed by private-sector actors, and companies have the responsibility to respect Human Rights, no matter where or how they operate and regardless of their size. The responsibility to respect is operationalised by companies carrying out Human Rights due diligence to assess their actual and potential adverse Human Rights impacts to understand what their Human Rights risks are based on their severity and likelihood.

In the context of the fourth version of the Equator Principles ("EP4"), each client is expected to conduct Human Rights due diligence in line with the UNGPs and to document that process in its Assessment Documentation. As indicated in Principle 2, clients are expected "to refer to the UNGPs when assessing Human Rights risks and impacts" (EP4, Principle 2) (particularly paragraphs 17-21 of the UNGPs). Accordingly, the depth of the Assessment should be dictated by the scope of project risks, which will also dictate the level of detail to be included in project documentation provided to the EPFI (EP 4, Principle 2). This document is the HRRA.

2 Overview of the Project

The Project is located 60km south of Baku, near to the Gobustan Mud Volcanoes, as part of a bilateral agreement with the government of Azerbaijan and the SPV. The Project Area ('Area 60') covers an area of 550 hectares. The closest urban areas are within Gobustan (5 km east – northeast 60) and Alyat (8 km southeast). The site is predominantly desert and semi-desert. There are no residential dwellings or other type of physical structures within the Project Area.

The land within the Project Area and surrounding region is owned by the government and is classified as industrial in Soviet times (meaning before 1989), being allocated for use in the oil and gas industry by the Ministry of Energy. The land is located in a zone that has long been identified as Industrial Zone and was specifically allocated by the Ministry of Energy for the development of the solar PV plant. In order to get official access, a Land Lease Agreement will be signed in the between SPV and the Ministry of Energy.

The Project will include the following components:

- Solar PV plant and a new substation;
- Road improvements to create a new access road along an existing track.

An overhead transmission line (OHL) of 330 kV connecting the site substation to national grid is currently planned by Azerenerji. The OHL will connect the area to the Janub station in Shirvan, 50-60 km in south-west direction. It will connect the already established Alat Trade Zone, Masdar Solar Project and other future strategic projects in the area. The OHL line is not considered as an associated facility in light of this Project as it will be constructed as part of the regional expansion of electrical distribution infrastructure and its development is not specifically linked to the development of this specific Project.

The new access road will follow the path of an existing track. The Ministry of Environment consented the access road on 11 August 2021, and permission from Garadagh Executive Power was also obtained. Permission from Absheron is expected in 2022. Construction of the road will be of the 5th technical category, which is a road without asphalt pavement and instead will use a compacted gravel coating.

The location of the Project is provided in Figure 1.1 and an example of the existing track which is to be used for the access road is provided in Figure 1.2.

Figure 1-1: Location of the Project Area

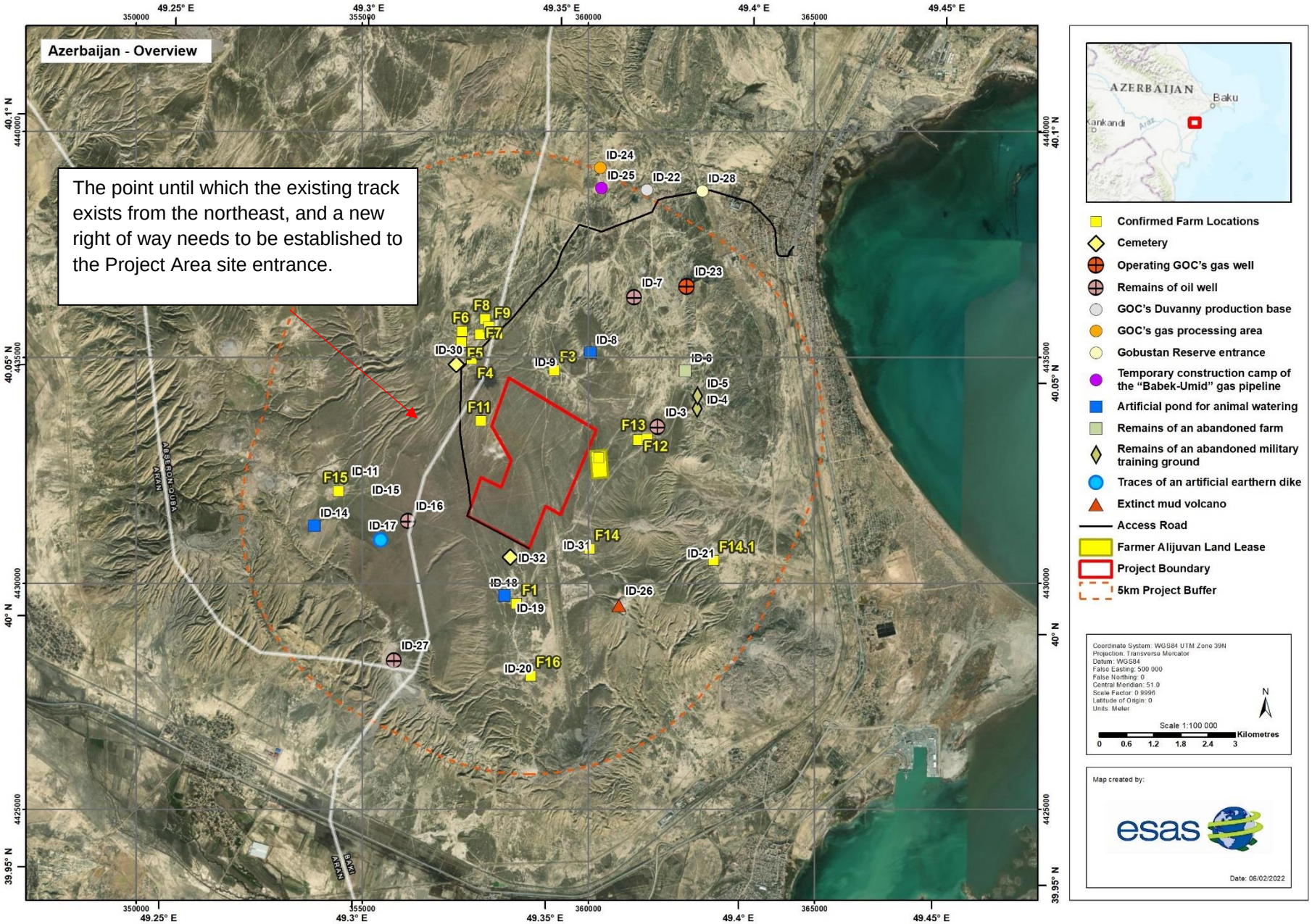


Figure 1-2: Views inside the Project Area

Figure 1-3: Example section of the existing track to be used for the new access road

Before any construction works start, the entire Project Area will be fenced off and the access road will be upgraded to allow the movement of large trucks to transport materials and personnel to the site. An existing track will be used from the northeast until there is a 'kink' in its path and a new right of way (2km long) will be established to the Project Area site entrance. Assuming that the width of the new road is 8m this will require an additional 1.6 hectares of land.

Activities during construction will include site clearance, construction of unpaved roads, temporary storage areas for different materials, and sub-station, installation of solar panels and development of the overhead transmission line. Construction activities will take 1.5 years to complete (18 months).

The temporary construction compound will include a parking area, a generator with fuel storage, and temporary buildings to provide accommodation and support facilities for managers and workers, secure storage, site offices, and welfare and first aid facilities. Security personnel will be present at the entrance gate as access to the Project Area during construction and operation will be prohibited. The project will intend not to use any land outside the boundary of the Project Area for offices, storage, etc. as all temporary facilities shall be located inside the Project Area. The location for the non-local workforce to be accommodated is not yet known although this is likely to be in Baku or a similarly large settlement. Temporary use of land may be necessary for worker accommodation and laydown areas.

During operation solar panels will be regularly cleaned of dust using water, and the electrical equipment will be regularly checked. During operations, up to 230 MW will be supplied to the national grid. The operational lifetime of the Project is 23 years.

While the land had been historically identified as an industrial zone, during the time it was not used by the Ministry of Energy, farmers and herders had started to use the lands to graze their animals. The Environmental and Social Impact Assessment (ESIA) Report prepared by Wood (16 June 2021), identified 11 farmers and 14 herders who were using the land to graze their animals.

Of the 11 farmers, 10 use the area to graze their animals between October and April and 1 grazes his animals throughout the entire year. These farmers also employ 14 herders to look after their livestock. All herders using the area are employees of the farmers and are using the facilities (houses and barns) of the farmers. There are no independent herders. The herders also have animals of their own. If the herders lose their job (or decide to move on), they lose their access to land. All farmers and herders had been living in the area for more than 5 years. The 11 farmer and 14 herder households, in total 25 project affected households (PAHs) consist of 53 + 55 = 108 family members or Project Affected People (PAPs). As the area has long been established as an industrial zone whose use rights only belonged to the Ministry of Energy, the farmers and herders are considered to be informal users of the land. While they are not entitled for compensation for the land they used, the project established a number of livelihood restoration measures to ensure that the affected people are better-off than pre-project times.

3 Objectives and scope

The HRRA was prepared based upon the Equator Principles 4 (EP4) Guidance Note: '*Implementation of Human Rights Assessments under the Equator Principles*' dated September 2020. The risk assessment takes into consideration the findings of the Environmental and Social Impact Assessment (ESIA), relevant concerns raised from stakeholders during implementation of the Stakeholder Engagement Plan (SEP), and other publicly available literature relevant to the assessment.

In accordance with the EP4 Guidance Note, the HRRA commences with the completion of an 'Initial scan for human rights impacts'. The scan identifies potential human rights risks within 11 topic areas. The topic areas included in the scan, which are relevant to the Project, are taken from the EP4 Guidance Note and are listed below:

<u>1. Labour:</u>

- Child labour
- Collective bargaining and freedom of association
- Modern slavery (forced labour/human trafficking) (this is assessed separately for Azerbaijan and also for China where solar panel components are to be procured from)
- Grievance mechanism and remedy
- Job security and the right to work

- Non-discrimination
- Occupational health and safety
- Wages (pay equity, standard of living)
- Working hours.
- Torture, cruel, inhuman and/or degrading treatment or punishment

2. Civil and political:

- Freedom of expression
- Right to life and security of person
- Right to privacy.
- Anti-bribery and corruption

3. Economic, social, and cultural:

- Right to education
- Right to health
- Right to water
- Cultural development
- Right to participate in the cultural life of the community

4. Social insurance and security

5. Land and resettlement:

- Right to property ownership
- Compensation and the right to an adequate standard of living
- Compensation in the context of gender and vulnerability.
- Right to freedom of movement.

6. Group rights / heightened risk of vulnerability:

- Children's rights
- Disability rights
- Indigenous peoples / migrants rights / ethnic minorities
- Women's rights.

4 Local context

As stated in Section 1, the Project is located in a rural area of Azerbaijan, 60km from Baku with the nearest settlement being Gobustan which lies 5 km to the east. The site is predominantly desert and semi-desert and there are no residential dwellings or other type of physical structures within the Project Area. Land within the Project Area is used for the grazing of livestock by farmers and herders (as herders typically have their own animals), informally.

The findings of a socio-economic survey undertaken during preparation of a Livelihood Restoration Plan (LRP) indicates that the average income of the farmers is generally higher compared to the herders. Farmer households also have a wider variety of income sources which include livestock as well as public/private salaries and access to pensions, compared to herder households who typically rely on livestock for income. Based upon this understanding, herder households are more vulnerable to external sources of change (such as land access restrictions arising from the Project, drought, increases in animal feed, etc.) compared to farmer households, although both types of households' experience very similar challenges to their livelihoods (a lack of water for livestock, expensive animal feed, and poor grazing land productivity). What is also clear is both types of

household's reliability on single areas of land for their livelihood, very few have an alternative land area available.

Farmers recruit herders to look after their livestock using verbal (not written) contracts. If a written contract is agreed between a farmer and a herder then they would need to pay tax and potentially provide other benefits, so farmers just provide verbal contracts only. Many of the farmers live on the outskirts of Baku City or Gobustan settlement, leaving the herders to live at the farm in shelters and very basic accommodation which provides them with a low standard of living. These structures are provided and maintenance by the farmer and access is granted whilst the herder is employed. The herder typically stays with his family and provide bedding and basic provisions, with all livestock equipment (fences, enclosures, etc.) being provided and owned by the herder.

Sometimes the herders can comprise part of the extended family of the farmer. The herders move with the entire livestock herd (their own and the farmer's animals as well) using large trucks and vehicles, to the summer pasture which varies considerably. The family moves with the herder so that they do not become separated. During the summer, farmers typically stay at their same location as they have other sources of income (see below) and visit the summer pasture area on an occasional basis. When the livestock herd is moved, this typically takes 2-3 weeks to move all of the animals. The women and children of the herder move in advance to establish the next place of living and wait for the male of the household (the herder) to arrive when all of the animals are transported.

A few of the herders engaged with are paid in livestock rather than just cash, whilst others are just paid in cash. The herders rely on farmers providing them with access to land and in this sense, they are 'tenants', whereby if they lose their job or decide to move on to another location, they lose access to this land. Herders typically move in and out of the region frequently, some decide to move on seeking improved economic opportunities elsewhere, whilst others may stay for long periods of time. Herders typically have their own livestock as well and it is estimated from the socio-economic surveys that around 20% of a herd can belong to the herder and 80% may be owned by the farmer.

Key issues associated with human rights risk at the local context include the following:

- Poor living standards faced by herders who are reliant on farmers to provide them with housing;
- The vulnerability of herders as they are essentially 'tenants' whose access to both grazing land and their housing is linked to the non-written, verbal employment contract with the relevant farmer;
- Evidence of fraudulent activity amongst regional government departments which is linked to the submission of written agreements (non-legal documents) by four farmers who claim they have access rights over parts of the Project Area. These written agreements are linked to activities within ''Azeraqrar Dovlet Istehsalat ve Emal Birliyi" MMC ("Azeraqrar State Production and Processing Union" LLC) which is part of the Ministry of Agriculture, "LLC" which is part of a regional government state entity, Absheron rayon Qobu Devecilik Damazliq Muessise (Absheron District Qobu Camel Breeding Institution), and Absheron Regional Executive Power. None of these written agreements are legally valid.

At a broader level, civic freedom in Azerbaijan is generally limited. There is a lack of independent media in the country. Political activism and criticism of the government is minimised by the State.

5 Potential Risks and Impacts Related to Human Rights

The purpose of this section is to describe the human rights risks that are connected to the Project, using a combination of severity and likelihood, noting where risks intersect or are interrelated to vulnerable people. A list of vulnerable people that could, potentially, be directly affected by the Project has been compiled and is listed below:

<u>Vulnerable people potentially impacted by economic displacement:</u>

- Persons who are elderly (defined as being aged 65 or over);
- Families who have lost both parents (they are orphans);
- Families where a disabled child is present, or a disabled parent is present;

- A family who is on a low income and lives below the national poverty line. This is classified by the State Statistical Committee for 2020 (the most recent published data available) to comprise a monthly household income of 195 AZN (USD 115) or less, or a household in substantial debt
- A widower raising two or more children under the age of 14, living separately from other relatives;
- Mothers or fathers who are bringing up the children in a single-parent family;
- Families in which both parents are unemployed;
- Single retired persons living on their own;
- Internally Displaced Persons (IDP) household;
- People with poor health status, or illiteracy in a farmer or herder household; and
- People who are discriminated against in society due to their ethnicity, belief system, health status (including HIV/COVID-19), sexual or gender orientation/self-identity.

Other types of vulnerable people potentially impacted by the Project or activities related to the Project:

- Children who may be part of the workforce;
- Workers amongst the directly contracted workforce (those holding a contract with the EPC Contractor) who may be subjected to violence and harassment, poor working conditions, inadequate occupational health and safety standards, and others.
- Workers based in supply chain companies who may be subjected to labour violations including those detailed above, in addition to child and forced labour.

The potential human rights risks that are directly connected to the Project, due to Project activities such as land-access restrictions, employment, and the use of a supply chain, are presented below in Table 5.1.

Table 5.1. Summary of potential human rights that are connected to the Project

Human rights risk	Potentially connected to the Project through one or more activities?	Probability (High, Medium Low)	Consequence (High, Medium, Low)	Links to vulnerable people?
Child labour	Yes – through employment	Low	High	Children who are part of the workforce
Collective bargaining and freedom of association	Yes – through employment	Low	Medium	None
Modern slavery	Yes – through employment and procurement from solar panels originating from China	Low for Azerbaijan-based suppliers. Medium for China-based suppliers.	High	None (Azerbaijan). Workers in supply chain companies (China)
Grievance mechanism and remedy	Yes – through employment	Low	Medium	Workers amongst the directly contracted workforce
Job security and the right to work	Yes – through employment	Low	Medium	Workers amongst the directly contracted workforce
Non-discrimination	Yes – through employment	Low	Medium	Workers amongst the directly contracted workforce
Occupational health and safety	Yes – through employment	Low	Medium	Workers amongst the directly contracted workforce
Wages (pay equity, standard of living)	Yes – through employment	Low	Medium	Workers amongst the directly contracted workforce
Working hours.	Yes – through employment	Low	Medium	Workers amongst the directly contracted workforce

Human rights risk	Potentially connected to the Project through one or more activities?	Probability (High, Medium Low)	Consequence (High, Medium, Low)	Links to vulnerable people?
Torture, cruel, inhuman and/or degrading treatment or punishment	Yes – through the use of security personnel	Low	Medium	Potentially, any type of person could be abused by a security personnel, irrespective of whether they are vulnerable, or not. However, women and young people may be subjected to abuse more frequently compared to a man of working age.
Freedom of expression	Not connected to the Project. There will be no restrictions on people's ability to criticise the Project should they wish to do so.			
Right to life and security of person	Yes – through the use of security personnel	Low	Medium	See above.
Right to privacy	Yes – through the collection of personal details from employment	Low	Medium	Workers amongst the directly contracted workforce
Anti-bribery and corruption	Yes – through procurement of materials and services	Low	Medium	None.
Right to education	No – there are no risks to educational rights.			
Right to health	No – there are no risks to health rights.			
Right to water	No – there are no risks to water rights.			
Cultural development	No – there are no risks to cultural development rights.			
Right to participate in the cultural life of the community	No – there are no risks to the right to participate in the cultural life of the community.			
Social insurance and security	No – there are no risks to social insurance and security. This will be provided to workers.			
Right to property ownership	No – the Project is not taking a person's property. There are no structures within the Project Area.			
Compensation and the right to an adequate standard of living	Yes – the Project will result in land-access restrictions.	Medium – land access restrictions will occur	Medium	Vulnerable people amongst affected farmer and affected herder households.
Compensation in the context of gender and vulnerability.	Yes – compensation will be provided to affected persons, including women.	Medium – land access restrictions will occur	Medium	Women amongst affected farmer and affected herder households.
Right to freedom of movement.	No – the Project will not restrict people's movement.			
Children's rights	No – there are no risks to children's rights.			
Disability rights	No – there are no risks to disabled people's rights.			
Indigenous peoples / migrants rights / ethnic minorities	No – there are no indigenous peoples, migrants or ethnic minorities identified amongst the Project Affected Persons.			
Women's rights.	No adverse risks have been identified. Women's rights will be strengthened by the Project through the provision of compensation specifically targeted to women, and local employment opportunities where specific measures will be undertaken to encourage women to attend.			

6 Methodology of Human Rights Assessment

The purpose of this section is to describe the approach followed to conduct the HRRA. The HRRA was undertaken during February in parallel with the final development of the Environmental and Social Impact Assessment (ESIA) and the LRP. The HRRA was prepared by ESAS in close collaboration with Wood and Wood's local in-country consultant Synergetics. The key documents used therefore comprised the following:

The ESIA, LRP, and also the United States Department of State: 2020 Country Reports on Human Rights Practices: Azerbaijan.

The human rights issued evaluated comprise all of those included under 'scope' in Section 3 which include the following categories:

1. Labour:
2. Civil and political:
3. Economic, social, and cultural:
4. Social insurance and security
5. Land and resettlement:
6. Group rights / heightened risk of vulnerability

Based upon these categories (and the relevant sub-categories include under 'Scope' in Section 3) The affected groups assessed under the HRRA comprised either 'Affected Communities' which comprise local people (generally) as well as the Project Affected Persons (these are the affected farmer and herder households) and 'workers' who comprise the workforce either based in Azerbaijan, or in supply chain companies to be used internationally for the sourcing of materials that are essential to the success of the Project, such as the procurement of solar panels from China.

The level of risk to the affected group was then assessed using the terminology included in the EP4 Guidance Note which comprises the following factors:

- Scale: High, medium or low – which reflects the magnitude of change associated with the human rights risk before mitigation is applied.
- Scope: Individual, household, community, region – which reflects the geographic area of the human rights risk before mitigation is applied.
- Remediability: - a description of the steps that will be taken by the SPV to address the risk before the harm occurs using mitigation and monitoring measures.
- Likelihood: High, Medium or Low – which reflects the potential for the human rights risk to occur, after standard mitigation has been applied. These refer to various plans that are to be prepared and implemented which form part of the SPV's Environmental and Social Management System (ESMS). Note that the list of plans and procedures in the final column of the table in Section does not include Masdar's Human Rights Policy as this is applies to every row in the table.

In accordance with the EP4 Guidance Note, overall human rights risks have been classified, after the mitigation measures have been applied, into:

Low-risks – where risks are unlikely to occur, if they did occur would not impact the Project or can be eliminated or mitigated through adherence to the SPV's Environmental and Social Management System (ESMS) through the use of standard mitigation and monitoring measures. These measures are considered as 'standard' in that the management plans referred to in the final column in Table 1 are already prepared, or under preparation, and therefore no additional actions are needed.

High-risks – which are those where further assessment and an in-depth analysis is required and where risks could cause a delay, reputational risk or breach of national or lender requirements for the Project, due to the specific characteristics of the Project and Project Area context.

7 Human Rights Initial Scan Findings

Human Rights Issue	Risk to workers and/or Affected Communities?	Human Rights Context in Azerbaijan and the Project Area	Inherent risk level (High or Low)	Human Rights Scan Assessment: Scale: High, Medium or Low Scope: Individual, household, community, region Remediability: Steps that could be taken to address the risk before the harm occurs. Likelihood: High, Medium or Low	Residual risk level (High or Low)	Proposed mitigation through implementation of Project plans and procedures
Human Rights category: Labour						
Child labour: ILO standards prohibit hazardous work for all persons under 18 years. They also prohibit labour for those under 15, with limited exceptions for developing countries. (Intersects with the rights of children and education).	Workers – There is a potential for child labour to be present within supply chain companies used by the EPC Contractor, particularly those that are contracted to provide catering, cleaners and other low-skilled roles, or from the suppliers of construction materials.	Azerbaijan has ratified all key international conventions concerning child labor including the International Labor Organization (ILO) No.182: Convention concerning the Prohibition and Immediate Action for the Elimination of the Worst Forms of Child Labour. Under Article 42 and 249 of the Labor Code the minimum age for a person to be employed is 15 years with a written employment contract. Children who are 14 may work in family businesses or, with parental consent, in daytime after-school jobs that pose no hazard to their health. Children younger than 16 may not work more than 24 hours per week; children 16 or 17 may not work more than 36 hours per week. The minimum age for hazardous work is 18 years under Article 250 of the Labor Code and Article 192 of the Code of Administrative Offenses (37,38). There is a list of hazardous occupations that prohibit children to work in, under Articles 98, 250–252, and 254 of the Labor Code, and also in Decree 58 of the Cabinet of Ministers in 2000: Article 9 of the Law on the Rights of the Child (37,39,40). Irrespective of what the law requires, children in Azerbaijan are involved in child labour within the agriculture sector primarily associated with harvesting potatoes and the production of cotton, tea, and tobacco. There is limited data to indicate the extent children are involved in other sectors of the economy. According to the United States Azerbaijan 2020 Human Rights Report[1] the government did not effectively enforce laws prohibiting child labor and setting a minimum age for employment. The government maintained a moratorium on routine and unannounced inspections, which may have prevented effective enforcement of child labor law. Resources and inspections were inadequate to enforce compliance, and penalties for violations were not commensurate with those for other analogous serious crimes. Although the Ministry of Labor and Social Protection could receive and respond to complaints, its response did not include worksite inspections. Instead, the State Labor Inspection Service within the Ministry of Labor and Social Protection investigated complaints by requesting information from the employer in question. On 22 July 2020, the president approved the National Action Plan for 2020-2024 on Combating Trafficking in Human Beings in the Republic of Azerbaijan. The plan tasked the relevant government bodies to continue efforts to: identify victims of human trafficking and forced labor including children; carry out special work with children engaged in begging; develop general standards of communication with child victims or potential victims of human trafficking; conduct training on the identification and protection of child victims or potential victims of human trafficking; and conduct awareness-raising work with entrepreneurs and employers in order to prevent the exploitation of child labor. During visits by foreign observers to observe the 2019 cotton harvest, they did not note any instances of child labor. Some non-governmental observers, however, reported instances of rural children younger than 15 sometimes working on the family farm or accompanying parents working as day laborers to agricultural fields.	**Low**	**Scale:** High as an incident could result in the injury or death of the child. **Scope:** Individual children and their household could be affected from human rights abuses. **Remediability:** Screening of all primary supply chain companies to understand their controls on the prevention of child labour in their organisation, and the actions they take to monitor the presence of children within their supply chain companies. Audits and inspections on primary suppliers will be undertaken. SPV and their EPC Contractor to only work with approved primary suppliers. **Likelihood:** Low. The presence of child labour is very unlikely to occur given the controls described above, although ongoing monitoring is required within the primary supply chain. This human rights risk will be addressed through standard control measures that are applied using SPV's ESMS.	**Low**	Standard controls (these already exist within SPV's ESMS): • Contractor and Supplier Management Plan • Construction Labour and Working Conditions Management Plan • Human Resources Policies and Procedures
Collective bargaining and freedom of association: Collective bargaining: Individuals have the right to form or join trade unions of their choice. Trade unions must be permitted to function freely, subject only to limitations that are in line with international Human Rights standards. Workers have the right to strike, in conformity with reasonable legal requirements.	Workers – Contracted workers within the supply chain may not be able to create or join a union or other type of association of their choice due to the attitude of senior management or other type of barrier.	The Law About Trade Unions determines the rights of trade unions in the Republic of Azerbaijan, details their activities in the protection of labour, social, economic rights and legal interests of trade union members in accordance with the Common Declaration of Human Rights, conventions and recommendations of the International Labour Organisation, the European Social Charter. Under Article 3, there is the right for employees, pensioners, and persons to be able to voluntary establish a trade union without permission or join an existing union. The membership of a trade union is very common in the public sector and is less common in the private sector. Senior managers do not discriminate against workers who have joined a trade union.	**Low**	**Scale:** High as a lack of collective bargaining could result in lower standards of working terms and conditions amongst the workforce. **Scope:** A number of individuals within the workforce could be affected from human rights abuses. **Remediability:** The ability of workers to form a union is guaranteed under national legislation. SPV and their EPC Contractor already have included in their labour policy, text that allows workers to	**Low**	Standard controls: • Human Resources Policies and Procedures • Construction Labour and Working Conditions Management Plan Contractor and Supplier

[1] United States Department of State. 2020 Country Reports on Human Rights Practices: Azerbaijan. Available at: https://www.state.gov/reports/2020-country-reports-on-human-rights-practices/azerbaijan/ [accessed 18 February 2022]

Human Rights Issue	Risk to workers and/or Affected Communities?	Human Rights Context in Azerbaijan and the Project Area	Inherent risk level (High or Low)	Human Rights Scan Assessment: Scale: High, Medium or Low Scope: Individual, household, community, region Remediability: Steps that could be taken to address the risk before the harm occurs. Likelihood: High, Medium or Low	Residual risk level (High or Low)	Proposed mitigation through implementation of Project plans and procedures
Freedom of Association: Protects the right to form or join all types of associations, including political, religious, sporting/recreational, non-governmental, and trade union associations.		According to the United States Azerbaijan 2020 Human Rights Report, unions are not always effective in negotiating wage levels and working conditions because government-appointed boards typically run large state-owned firms and set wages for government employees. The law provides most private-sector workers the right to conduct legal strikes but prohibits civil servants from striking. Categories of workers prohibited from striking include high-ranking executive and legislative officials; law enforcement officers; court employees; fire fighters; and health, electric power, water supply, telephone, railroad, and air traffic control workers. The law prohibits discrimination against trade unions and labor activists and requires the reinstatement of workers fired for union activity. The law also prohibits retribution against strikers, such as dismissal or replacement. Many unions are not independent, and the overwhelming majority remained tightly linked to the government. Collective bargaining agreements were often treated as formalities and not enforced. Although labor law applies to all workers and enterprises, the government may negotiate bilateral agreements that effectively exempt multinational enterprises from it. For example, production-sharing agreements in the oil and gas sector supersede domestic law and often do not include provisions for employee participation in a trade union. While the law prohibits employers from impeding the collective bargaining process, employers engaged in activities that undercut the effectiveness of collective bargaining, such as subcontracting and using short-term employment agreements.		freely form, or join, a union without any discrimination. **Likelihood:** Low. The prohibition of union membership is unlikely to occur, given the controls described above although ongoing monitoring will still be required within the primary supply chain. This human rights risk will be addressed through standard control measures that are applied using SPV's ESMS.		Management Plan to include audits and inspections on high-risk supply companies.
Modern slavery (forced labour/human trafficking) - Azerbaijan: Slavery exists when one human effectively owns another. Forced or compulsory labour is defined by the ILO as all work or service that is extracted under menace of any penalty and for which the person has not voluntarily offered themselves.	Workers – Modern slavery may exist within the contracted workforce where people (including migrants and women) are forced to work, or where their employer has placed them into a position of financial debt upon their start of work. There is also the potential for workers' passports to be retained by their employer to prevent them from leaving the workplace.	National legislation associated with the prohibition of slavery comprises the Prohibition of Forced Labor (Article 35 of the Constitution) and Article 144-2 of the Criminal Code. In 2020, the Ministry of Internal Affairs a single case of forced labor involving two minors. On 22 July 2020, the president approved the National Action Plan for 2020-2024 on Combating Trafficking in Human Beings in the Republic of Azerbaijan. According to the United States Trafficking in Persons Report June 2021[2], Azerbaijan is on the Tier 2 Watch List (defined as Countries whose governments do not fully meet the Trafficking Victims Protection Act's minimum standards but are making significant efforts to meet those standards. The government investigated and prosecuted fewer suspects and convicted fewer traffickers. The government lacked proactive identification efforts, resulting in victims likely penalized for unlawful acts their traffickers compelled them to commit. The government continued to lack interagency cooperation on anti-trafficking efforts and continued its moratorium on scheduled and unannounced labor inspections through 2021. Because the government has devoted sufficient resources to a written plan that, if implemented, would constitute significant efforts to meet the minimum standards, Azerbaijan was granted a waiver per the Trafficking Victims Protection Act from an otherwise required downgrade to Tier 3.	**Low**	**Scale:** High, as slavery could have a long-term impact on the mental health and general wellbeing of the individual. **Scope:** A number of individuals could be affected from human rights abuses. **Remediability:** Screening of primary suppliers to understand their controls on the prevention of modern slavery in their organisation. Audits and inspections on primary suppliers will be undertaken. SPV and their EPC Contractor to only work with approved primary suppliers. **Likelihood:** Low. Forced labour is unlikely to occur within the Project's nationally based primary suppliers. This human rights risk can be addressed through standard control measures that are applied using SPV's ESMS.	**Low**	Standard controls: • Contractor and Supplier Management Plan to include audits and inspections on high-risk supply companies (apart from the solar pans supplier – see below) • Construction Labour and Working Conditions Management Plan • Human Resources Policies and Procedures • SPV and their EPC Contractor to only work with approved suppliers
Modern slavery (forced labour/human trafficking) - China: Slavery exists when one human effectively owns another. Forced or compulsory labour is defined by the ILO as all work or service that is extracted under menace of any penalty and for which the person has not voluntarily offered themselves.	Workers – Modern slavery may exist within the contracted workforce where people (including migrants and women) are forced to work, or where their employer has placed them into a position of	There have been international media reports in 2021[3] associated with allegations associated with the use of forced labour camps to manufacture photovoltaic panels from the Xinjiang province in China. The potential risk of modern slavery was identified as a potential source of human rights risk at an early stage by Masdar. The Masdar group (which includes all subsidiaries which Masdar controls) observes and practises the highest level of professional ethics, fairness, transparency and compliance with international standards with respect to all activities it undertakes, including its tendering process. On this basis, Masdar adopted the Mubadala code of conduct in 2014 as well as the Mubadala Supplier Code. Both policies, along with the extensive Ethics & Compliance	**High**	**Scale:** Low, as this risk was identified during the early tendering stage and Masdar's requirements have been clearly defined and specified during the procurement process. **Scope:** A number of individuals could be affected from human rights abuses. **Remediability:** Detailed checks on potential bidders during the tendering stage prior to contract award which have been completed.	**Low**	Standard controls: • Mubadala Code of Conduct • Mubadala Supplier Code • Mubadala Ethics & Compliance Program

[2] United States Department of State. United States Trafficking in Persons Report June 2021. Available at: https://www.state.gov/wp-content/uploads/2021/09/TIPR-GPA-upload-07222021.pdf [accessed 18 February 2022]
[3] Fears over China's Muslim forced labor loom over EU solar power. 2021. POLITICO. Available at: https://www.politico.eu/article/xinjiang-china-polysilicon-solar-energy-europe/ [accessed 18 February 2022]

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	financial debt upon their start of work. There is also the potential for workers' passports to be retained by their employer to prevent them from leaving the workplace.	Program which Mubadala has in place, are rigorously observed, and complied with by the Masdar group. In addition, Masdar takes the principles of the Suppler Code (which prohibits the use of Slave Labour) seriously when dealing with vendors and suppliers. The tendering and procurement process of the PV modules has accordingly been conducted in line with the above requirements. Specific, legally-binding wording shall be included in the EPC Contract for ongoing negotiations, and applied to the EPC Contractor, and its own suppliers and contractors. Written confirmation on the compliance with these codes has already been obtained from the EPC Contractor.		**Likelihood:** Low. The potential human right risks from modern slavery in the supply chain associated with the procurement of solar panels from China has been taken into consideration and has a low likelihood of occurring.		• LONGi Green Energy Co. Code of Conduct for LONGI Suppliers (Nov 2020) • Masdar and their EPC Contractor to only work with approved suppliers
Grievance Mechanism and Remedy: All people have the right to remedy when their rights have been violated. Where business enterprises identify that they have caused or contributed to adverse Human Rights impacts, they should provide for or cooperate in their remediation through legitimate processes, whether through the company's own operational-level grievance mechanism or through cooperation with independent, non-judicial mechanisms.	Workers and Affected Communities – People may not be able to raise a grievance or seek remedy from a Project impact if they are unaware of the grievance mechanism, or do not understand/are unwilling to use it for fear of retribution or other issue.	An individual is able to raise a complaint against a business in accordance with Law "On the procedure for considering appeals of citizens" (2015, № 1308-IVQ). Typically, a citizen would approach a community leader in advance of launching any administrative action. The court system can be slow. The price of judicial action is a minimum of 30 AZN (18 USD or higher depending upon the monetary value of the claim. Article 8 of the legislation referred to above includes details of the state fee for filing a claim and how this should be undertaken. Grievances that are not labour-related are typically resolved using local community leaders and judicial remedy is also available through the court system. The constitution process for the presumption of innocence and the right to a fair public trial.	**Low**	**Scale:** High to low depending upon the nature of the grievance. **Scope:** Both individuals and their communities could be affected from human rights abuses. **Remediability:** A fully implemented grievance mechanism will be available for the workforce to raise concerns, should they wish to do so. Details of the worker grievance mechanism will be included in the basic HSE induction that all of the workforce will be provided with (including all workers in primary suppliers). During the Project, workers will be reminded about the availability of the grievance mechanism on a regular basis. SPV and their EPC Contractor to only work with approved suppliers. A community grievance mechanism will also be available and implemented in accordance with the Stakeholder Engagement Plan. **Likelihood:** Low. There will be established procedures for workers and local community residents to raise a grievance, should they wish to do so. This human rights risk will be addressed through standard control measures that are applied using SPV's ESMS.	**Low**	Standard controls: • Worker Grievance Mechanism • Human Resources Policies and Procedures • Community Grievance Mechanism • Stakeholder Engagement Plan
Job Security/Right to Work: The termination of an employment relationship is likely to be a traumatic experience for a worker and the loss of income has a direct impact on the family's well-being. The employment of a worker should not be terminated unless there is a valid reason for such termination connected with the worker's capacity or conduct or based on the operational requirements of the undertaking, establishment, or service.	Workers – The construction workforce are likely to be employed on a contract basis that reflects the duration of the construction stage.	A worker's employment can be terminated in accordance with the Labor Code (01 February 1999). Legal grounds for terminating an employment contract can be any of the following: a) the initiative of one of the parties; b) expiration of the employment contract; c) a change in terms and conditions of employment; d) cases related to a change in the ownership of an enterprise (employees indicated in Subsection II of Section 63 of this Code); e) Cases established by the Parties in the employment contract. An employment contract may be terminated at the employer's initiative in the following cases: a) the enterprise is liquidated; b) there is a personnel cut-back at the enterprise; c) a competent body decides that the employee does not have the professional skills for the job he holds; d) the employee does not fulfil his job description or fails to perform his duties as defined by the employment contract and job description. An employee may terminate an employment contract by notifying the employer in writing one calendar month in advance. If an individual employment contract is terminated due to a reduction in employees or staff, the employee shall be officially notified by the employer two months in advance.	**Low**	**Scale:** High, as sudden termination of their contract could have a significant impact on the wellbeing and economic status of the household. **Scope:** Both individuals and their household could be affected from human rights abuses. **Remediability:** Workers shall be informed on a regular basis that their contract is temporary so that termination does not come as a sudden shock to them. SPV and their EPC Contractor to only work with approved primary suppliers. **Likelihood:** Low. Workers shall be contracted on short-term contracts and no retrenchment is expected to occur. Workers in all primary suppliers will also be regularly informed of their short-term contract terms and conditions.	**low**	Standard controls: • Human Resources Policies and Procedures • Contractor and Supplier Management Plan. • Human Resources (HR) Department to ensure that workers understand the terms of their employment. This will include regularly informing workers of the short-term nature of their contract.
Non-discrimination: The practice of ensuring equal treatment and respect for all individuals regardless of class,	Workers – Part of the workforce may be subject to discrimination	Article 25 of the Constitution of the Republic of Azerbaijan approved on 12 November 1995 equal rights and liberties for all citizens irrespective of gender and prohibits any restrictions of human and citizen rights and freedom on grounds of gender. Additionally, the principle of equality	**High**	**Scale:** High, as discrimination or harassment in the workplace could have significant impact on an individual's wellbeing.	**Low**	Standard controls:

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race, colour, sex, religion, gender, age, political or other opinion, national or social origin, property, sexual orientation, disability, employee status, marital status, familial connection, etc. Includes ensuring employees are free from harassment.	or harassment. Migrants and women are particularly at risk.	between men and women has been widely established in the legislative system and Article 35 of the Constitution mentions that every citizen based on his/her capability is entitled to freely choose a certain type of activity, occupation, employment or workplace, to work in a safe and healthy environment and to be paid without any kind of discrimination for his/her work no less than the amount of minimum wage defined by the government. Sections 12 and 16 of the Labor Code (01 February 1999) deal with discrimination in the workplace. During the hiring or termination process no discrimination is permitted on the basis of citizenship, gender, race, nationality, language, place of residence, economic standing, social origin, age, family circumstances, religion, political views, affiliation with trade unions or-other public associations, professional standing, beliefs, or other factors unrelated to the professional qualifications, job performance, or professional skills of the employees, nor is permitted to establish privileges and benefits or directly or indirectly limit rights on the basis of these factors. An analysis of the labour rights appeals sent to the Ombudsman office (672 complaints in 2014, 960 in 2015, 958 in 2016) demonstrates that no complaint was received on cases of employment discrimination, as well as gender-based discrimination (particularly equal payment for equal work of women and men) and sexual and emotional harassment at work. According to the United States Azerbaijan 2020 Human Rights Report, although women nominally enjoy the same legal rights as men, societal and employment-based discrimination remains a problem. According to the State Statistical Committee, there was discrimination against women in employment, including wide disparities in pay and higher rates of unemployment.		**Scope:** Individuals could be affected from human rights abuses. **Remediability:** Workers will be required to sign to a Worker Code of Conduct that will prohibit any form of discrimination or harassment in the workplace and ensure that the workplace is suitable for the presence of all persons. SPV and their EPC Contractor to only work with approved primary suppliers. There will also be a specific code of conduct for security personnel that includes non-discrimination, treatment of women, and the use of force (all weapons are prohibited). **Likelihood:** Low. This human rights risk will be addressed through standard control measures that are applied using SPV's ESMS. The Worker Grievance mechanism can be used to raise any concerns about the behaviour of other workers.		• Human Resources Policies and Procedures • Worker Code of Conduct • Worker Grievance Mechanism • Construction Labour and Working Conditions Management Plan • Security and Human Rights Management Plan • Gender Management Plan
Occupational health and safety: A company should provide safe and healthy working conditions to workers, develop a policy to minimise safety risks, provide personal protective equipment free of charge, training, monitoring measures, and the ability of workers to remove themselves from work situations where imminent and serious health dangers are reasonably perceived, without undue consequences.	Workers – The direct and contracted workforce may be exposed to unsafe conditions, be required to pay for PPE, or undertake acts that they do not consider to be safe. Occupational health and safety risks that will need to be identified and mitigated to as low as reasonably practicable.	National legislation associated with occupational health and safety in the workforce is Act No. 313 of 29 September 1992 on labour protection followed by the Labour Code (01 February 1999) which also contains provisions on occupational safety and health (refer to chapters 33-36). A company does have to hold occupational insurance that can be used to compensate a worker in the event of an injury or fatality in the workplace. insurance payments are made to employees on disability or death as a result of occupational accidents and diseases, and injuries that prevent work in the future.	**High**	**Scale:** High as an occupational health and safety incident could result in injury or death of a worker. **Scope:** The individual and their household could be affected from human rights abuses. **Remediability:** The primary suppliers used will be checked to ensure that they have adequate experience and competence to complete the tasks assigned to them, including the correct use of Personnel Protective Equipment (PPE), standard operating procedures associated with high-risk activities such as electrical safety, permit to work system, adequate emergency response measures and the provision of medical evacuation facilities. The occupational health and safety risks to the workforce will be addressed through the implementation of a risk-based Health and Safety Plan, method statements and standard procedures. A specialist team will be involved in commissioning electrical equipment and all commissioning work will be undertaken by competent persons. SPV and their EPC Contractor will only work with approved primary suppliers. **Likelihood:** Low. This human rights risk will be addressed through standard control measures that are applied using SPV's ESMS. All primary suppliers have experience in the type of construction activities to be undertaken, and the risks to the workforce are not unique.	**Low**	Standard controls: • Health and Safety Policy • Occupational Health and Safety Plan • Contractor and Supplier Management Plan Emergency Preparedness and Response Plan • Human Resources Policies and Procedures • Worker Grievance Mechanism

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Wages (pay equity, standard of living): A company must protect the right to remuneration that provides workers with fair wages and equal remuneration for work of equal value. Remuneration must also be enough to provide workers with a decent living for themselves and their families.	Workers – The contracted workforce (such as cleaning staff or manual labourers) may be asked to work for very low pay (minimum wage) that does not provide a decent standard of living.	According to the Labor Code (01 February 1999) the minimum wage is a social norm that determines the minimum level of monthly wages for unskilled labor and services, taking into account economic and social conditions. As of February 2022, this is currently 250 AZN per month (147 USD per month). Over the last 3 years the minimum wage has increased. The national legislation still applies to workers on a contract that are not full-time employees of a company. Violations associated with the payment of wages below the minimum statutory level are not common.	**Low**	**Scale:** Medium, as this depends on the difference between the salary provided and the relevant minimum wage category and salary. **Scope:** The individual and their household could be affected from human rights abuses. **Remediability:** In accordance with the Construction Labour Management Plan, primary supply chain companies will be audited to understand their salary levels and compliance with minimum wage legislation and checked to ensure that this provides a decent standard of living standard. This Plan will include a employment contract template for EPC locally hired direct staff. Also, the plan will outline the minimum conditions for work for any sub-contracted staff. SPV and their EPC Contractor will only work with approved primary suppliers. **Likelihood:** This human rights risk will be addressed through standard control measures that are applied using SPV's ESMS.	**Low**	Standard controls: • Human Resources Policies and Procedures • Contractor and Supplier Management Plan which will include auditing primary supply chain companies to gather information on their salary levels. • Worker Grievance Mechanism • Construction Labour and Working Conditions Management Plan which will include completion of the benchmarking exercise.
Working Hours: Working hours should be no more than 48 hours a week, or 10 hours a day. Workers should have 1 day off every 7 consecutive days.	Workers – The workforce may be asked to excessive hours during construction.	According to the Labour Code (01 February 1999) working hours are divided into normal working hours, shorter working hours, overtime and part-time work. Normal working hours is determined in Article 89 as maximum 8 hours per day while not exceeding 40 hours in a week. The working week can be determined as either 5-day or 6-day. Shorter working hours are defined in the Articles 91, 92, 93 for the specific categories of employees based on their age, health, working conditions and duties. Part-time work is agreed between the parties and conditions are determined in the contract (Article 94). This applies to both full-time and contracted workers. When the hours worked exceed those agreed in contract based on the employer's order and employee's consent, it is considered as overtime. Every worker cannot be involved in overtime work for more than 4 hours over the 2 consecutive working days. The overtime hours worked must be reimbursed in accordance with Article 165. This applies to both full-time and contracted workers. During the working day or shift, employees should be provided with a break for rest and lunch. The time and duration of the break is determined by the internal disciplinary rules, shift schedule or employment contract. The rest period after the end of the working day shall not be less than 12 hours (Article 103). Weekly rest periods cover 2 consecutive days in 5-day working week and one day in 6-day working week (Article 104). According to Article 105 public holidays are not considered as working days in Azerbaijan. Worker's leave is categorised into annual leave (including standard and additional vacation time), social leave for maternity and childcare, educational leave and unpaid leave. Annual leave is measured in working days. A prerequisite for its use is work of at least 6 months for at least 21 working days. Depending on the work experience of the employee, additional vacation time is added to the standard annual leave. This applies to both full-time and contracted workers.	**Low**	**Scale:** Medium, depending upon the quantity of excess overtime hours worked. **Scope:** Individuals and their household could be affected from human rights abuses. **Remediability:** All construction workers in primary suppliers shall be provided with details of the terms of their employment (including working hours, wages, deductions, etc.) prior to them accepting the role so that they are fully aware of the accommodation arrangements (if any), working time and period they are expected to attend the workplace on consecutive days without a break. SPV and their EPC Contractor to only work with approved primary suppliers. **Likelihood:** Low. Whilst provisions of national legislation do not typically cover contracted workers, working terms and conditions will be provided to the workforce in primary suppliers. This human rights risk will be addressed through standard control measures that are applied using SPV's ESMS.	**Low**	Standard controls: • Human Resources Policies and Procedures • Contractor and Supplier Management Plan • Worker Grievance Mechanism • Construction Labour and Working Conditions Management Plan
Torture, cruel, inhuman and/or degrading treatment or punishment: No one shall be subjected to torture or to cruel, inhuman or degrading treatment or punishment. In particular, no one shall be subjected without his or	Affected Communities – Security personnel could be abusive and degrade local people who are seeking to protest or raise a grievance against the Project.	Stakeholder perceptions towards the Project gathered during preparation of the ESIA and LRP are broadly positive towards the Project, and extensive consultation has been undertaken to inform Project Affected Persons about the compensation strategy for land-related access restrictions. Security personnel will be contracted using third-party company and government-provided security personnel will not be used.	**Low**	**Scale:** Individuals and their household. **Scope:** Individuals and their household could be affected from human rights abuses. **Remediability:** All security personnel involved in the Project will be screened prior to their use, for past involvement in human rights abuses. Ongoing monitoring of their behaviour shall be undertaken,	**Low**	Standard controls: • Security Personnel Management Plan • Security Personnel Code of Conduct

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her free consent to medical **or scientific experimentation.**				and a Security Personnel Code of Conduct will be used. **Likelihood:** Low. It is considered to be very unlikely that a security personnel will subject a local person to degrading treatment at the site. This human rights risk will be addressed through standard control measures that are applied using SPV's ESMS.		• Community Grievance Mechanism
Human Rights category: Civil and political						
Freedom of expression: The right to hold opinions free from outside interference is an absolute right, with narrow restrictions by States only permissible when in line with international Human Rights standards. Individuals have a right to seek, receive and impart ideas in whatever media or form they choose.	Workers – The direct and contracted workforce may not be able to express their opinions freely without fear of retribution. Affected Communities - The government may try and censor information in the public domain about a Project in a way which is not aligned with international human rights standards.	The Constitution is the basis of the freedom of speech and expression in Azerbaijan. Provisions that are relevant to the freedom of expression are Article 47 (freedom of thought and speech), Article 50 (freedom of information), and Article 51 (freedom of artistic speech). According to the United States Azerbaijan 2020 Human Rights Report, although the constitution provides for freedom of expression, the government continued to repress persons it considered political opponents or critics. Government-owned and progovernment outlets continued to dominate broadcast and print media. Foreign media outlets, including Voice of America, RFE/RL, and the BBC, remained prohibited from broadcasting on FM radio frequencies although the Russian service Sputnik, which was also originally prohibited from broadcasting, was subsequently allowed to broadcast news on a local radio network.	**Low**	**Scale:** High as this freedom of expression applies to entire communities. **Scope:** Individuals and their communities could be affected from human rights abuses. **Remediability:** The Worker Code of Conduct will allow opinions to be freely expressed about the Project and activities undertaken by SPV, unless this has the potential to cause offence to other workers such as the use of discriminatory language for example. Farmers and herders present within 5km of the Project Area will be provided with accurate and timely information about the Project through the implementation of the Stakeholder Engagement Plan. **Likelihood:** The outcome of stakeholder engagement activities with farmers and herders has recorded some negative perceptions towards the Project from the reduction in grazing land from land access restrictions. The right to hold opinions free from outside interference can be addressed through standard control measures that are applied using SPV's ESMS.	**Low**	Standard controls: • Worker Code of Conduct • Worker Grievance Mechanism • Stakeholder Engagement Plan • Community Grievance Mechanism
Right to life and security of person: Individuals have the right not to be deprived of life arbitrarily or unlawfully. This includes the right to have one's life protected, for example, from physical attacks or health and safety risks.	Workers and Affected Communities – Security personnel used by the Project, which may include a combination of government and private security forces, may use inappropriate force against workers of people from Affected Communities.	There are no ongoing security risks or concerns in the Project Area. According to the United States Azerbaijan 2020 Human Rights Report, although the law prohibits arbitrary arrest and detention and provides for the right of persons to challenge the lawfulness of their arrest or detention in court, the government generally did not observe these requirements.	**Low**	**Scale:** High, as an incident could result in injury or death of a local person or substantially affect their wellbeing. **Scope:** Individuals and communities could be affected from human rights abuses. **Remediability:** SPV will contract the services of a third-party security company to provide security at the Project Area. All security personnel contracted for the Project by primary suppliers will be screened to check if they have been involved in past human rights abuses, be provided with training and a Security Code of Conduct, a risk assessment will be completed, and their behaviour monitored by SPV during completion of their contract. SPV will encourage the third-party company to recruit female personnel so that not all of the security personnel are male. **Likelihood:** Low. The unlawful use of force by security forces is unlikely to occur given the controls described above although ongoing monitoring will still be required. This human rights risk can be addressed through standard control measures that are applied using SPV's ESMS.	**Low**	Standard controls: • Security and Human Rights Management Plan • Security Personnel Code of Conduct • Community Grievance Mechanism

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Privacy: Individuals have a right to be protected from arbitrary, unreasonable or unlawful interference with their privacy, family, home or correspondence and from attacks on their reputation. The State is allowed to authorize restrictions on privacy in line with international Human Rights standards, but 'arbitrary' restrictions are always prohibited.	Workers – Confidential information will be held by the Project and supply chain companies of the direct and contracted workforce.	Personal data in Azerbaijan, its protection, transmission, the responsibility of data users and other aspects of data regulations are expressly regulated by the laws, specifically by the Personal Data Law (11 May 2010 No 998-IIIQ). The law prohibits arbitrary invasions of privacy and monitoring of correspondence and other private communications. According to the United States Azerbaijan 2020 Human Rights Report, the government generally did not respect these legal prohibitions.	**Low**	**Scale:** Medium, although this depends upon the extent of any breach in privacy through the uncontrolled release of data. **Scope:** Individuals could be affected from human rights abuses. **Remediability:** All data gathered on workers and their personal situation (including health certificates) must be stored in a confidential manner in a locked room for paper records, and using password protected digital devices. **Likelihood:** Low, as the information to be held is likely to comprise basic details on each person for the purpose of human resources records only. Data breeches for this type of information are uncommon in Azerbaijan. This human rights risk can be addressed through standard control measures that are applied using SPV's ESMS.	**Low**	Standard controls: • Human Resources Policies and Procedures • Worker Grievance Mechanism
Anti-bribery and corruption: Corruption can have a devastating impact on the availability, quality and accessibility of human rights-related goods and services. Moreover, it undermines the functioning and legitimacy of institutions and processes, the rule of law and ultimately the State itself.	Workers – Workers involved in the Project may attempt to gain procurement opportunities through bribery and corruption. Individuals working in government departments involved in the implementation of the LRP.	Individuals working in government departments involved in the implementation of the LRP may try and influence the implementation of compensation measures through corrupt means. There is also the potential for workers to try and seek procurement opportunities and economic benefits to themselves, through corruption and bribery.	**Low**	**Scale:** Medium, although this depends upon the extent of corruption amongst the workforce, or in government departments. **Scope:** Individuals and their households could be affected from human rights abuses. **Remediability:** Strict controls on procurement shall be undertaken by SPV. Implementation of the LRP shall be carefully monitored using the monitoring and evaluation metrics, and financial records shall be held centrally by the Project Team during LRP implementation, to demonstrate that compensation has been delivered to those who are eligible for it. **Likelihood:** Low, as procurement and implementation of the LRP's compensation is to be very carefully monitored by senior management. Interference from a government department or a worker is very unlikely to occur. This human rights risk can be addressed through standard control measures that are applied using SPV's ESMS.	**Low**	Standard controls: • Anti-Bribery and Corruption Policy. • Worker Code of Conduct • Procurement controls • Community Grievance Mechanism • Worker Grievance Mechanism
Human Rights category: Economic, social and cultural						
Right to education: All children have the right to free and compulsory primary education. The right also includes equal access to education and equal enjoyment of educational facilities, among other aspects.	Affected Communities – Restrictions in access to educational facilities during construction could disrupt children's education.	National legislation requires children to attend school in accordance with Article 19 of the Law on Education. Education is provided free of charge under Article 13. According to the United States Azerbaijan 2020 Human Rights Report, while education is compulsory, free, and universal until age 17, large families in impoverished rural areas sometimes placed a higher priority on the education of boys and kept girls in the home to work.	**Low**	**Scale:** Low as changes in access to educational facilities are not expected from the Project. **Scope:** Individuals and communities could be affected from human rights abuses. **Remediability:** None required as the Project will not generate access restrictions to schools. **Likelihood:** Low. This human rights risk can be addressed through standard control measures that are applied using SPV's ESMS.	**Low**	Standard controls: • Community Grievance Mechanism
Right to health: Individuals have a right to the highest attainable standard of physical and mental health. This includes the right to have control over one's health and body, and freedom from interference.	Affected Communities – The Project will generate community health and safety risks associated with the use of vehicles, construction machinery, the presence of excavations, and other	Public hospitals are run by the state and medical care is offered free of charge for Azerbaijani residents. The introduction of compulsory health insurance in the country is scheduled for completion in 2021. Individuals can pay for private healthcare should they wish to do so. Health facilities in Alyat and Gobustan lack qualified doctors and medical equipment, including ambulances for first aid purposes and emergencies. The recent United city hospital No. 17 and Children's polyclinic No. 9 in Gobustan are reported as the main health facilities nearby in the Project area, ensuring the availability of all types of medical services..	**Low**	**Scale**: High as an incident could result in injury or death of a local person. **Scope:** Individuals and communities could be affected from human rights abuses. **Remediability:** Construction risks and impacts for this type of Project are well-understood. A Community Health and Safety Plan will be implemented and include commitment to, for	**Low**	Standard controls: • Community health and safety within the CEMP, OEMP, Traffic and Transport Management Plan (TTMP) and

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	sources of risk during construction. During operation, the OHLs will generate electronic magnetic fields (EMF). *NOTE: although there is often concern about the potential health effects associated with exposure to EMF there is no empirical data demonstrating adverse health effects from exposure to typical EMF levels from power transmission lines and equipment.*			example, fence off all working areas where machinery and/or excavations are present to prevent unauthorised entry, provide workers with free medical care, informing local people (including farmers and herders) of the presence of construction works in advance and the associated risks of trying to enter them, and the Project Area will be attended by security personnel to prevent trespass. Workers will be provided with first aid, free of charge (including the non-local workforce), suitable sun protection and shaded areas for respite, access to clean water to avoid heat stress and dehydration, and welfare facilities. Worker health screening to be undertaken including preventative measures for the control of transmissible diseases such as COVID-19. **Likelihood:** Low, as health risks to workers and affected communities can be managed through the use of standard controls. This human rights risk can be addressed through standard control measures that are applied using SPV's ESMS.		Security and Human Rights Management Plan. • Stakeholder Engagement Plan • Community Grievance Mechanism • Health and Safety Policy • Occupational Health and Safety Plan • Worker Grievance Mechanism
Right to Water: Individuals have the right to water and sanitation	Workers – The direct and contracted workforce will need to be provided with safe drinking water and suitable sanitation facilities. Affected communities – have the right to drinking water supplies.	The right to water is reflected in the constitution. Water scarcity is a problem within farms in the Project Area and there have been numerous requests for assistance in improving access to clean water during the stakeholder engagement activities completed.	**Low**	**Scale:** High as water is essential for sustaining life and the Project is in a dry, hot location where water intake will be important to maintain and monitor to prevent dehydration. **Scope:** Individuals could be affected from human rights abuses. **Remediability:** Adequate drinking water and sanitation facilities will be provided to the workforce at construction site and at accommodation facilities (a pipeline will be extended from Gobustan to provide potable drinking quality water). The standard of accommodation provided to the workforce shall comply with the applicable requirements of the IFC/EBRD Guidance Note on Workers' accommodation: processes and standards (2010). **Likelihood:** Low. Potable drinking water quality shall be obtained from an extension to the existing regional water supply network.	**Low**	Standard controls: • Occupational Health and Safety Plan • Worker Accommodation Management Plan (or similar depending upon the accommodation arrangements of the non-local construction workforce) • Worker Grievance Mechanism
Social Insurance and Security: This right obliges the State to create and maintain a system of social security that provides adequate benefits for a range of issues, including injury in the workplace and from unemployment.	Workers – The direct and contracted workforce will need to be provided with social insurance from their employer in accordance with national legislation to ensure that they have adequate compensation from any injury or fatality that occurs.	The social protection system in Azerbaijan consists of programs aimed at reducing the poverty and economic problems of the population through promoting effective labor markets as well as reducing the risks faced by citizens. Social insurance consists of pensions, unemployment benefit, and other social benefits. Social allowances consist of monthly payment for pensions, a separate pension for disabled persons, to parents who have children under 18 years with a disability, and also for families with a low-income with children under 1 year old. Additionally, one-off payments are provided to eligible working parents of newborn babies, support to pay for funerals, treatment to victims of industrial accidents, and those affected by war.	**Low**	**Scale:** High, as an occupational health and safety incident could result in injury or death of a worker or local person. **Scope:** Individuals could be affected from human rights abuses. **Remediability:** All companies involved in the Project will be required to provide occupational insurance in accordance with national legislation, and this will be reflected in the tender and contractual documents used with primary suppliers. SPV and their EPC Contractor to only work with approved primary suppliers. **Likelihood:** Low, as occupational insurance shall be provided to all workers. This human rights risk can	**Low**	Standard controls: • Human Resources Policies and Procedures • Worker Grievance Mechanism • Labour and Working Conditions Management Plan • Contractor and Supplier Management Plan

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				be addressed through standard control measures that are applied using SPV's ESMS.		
Economic, social and cultural development: Economic, social, and cultural rights are the freedoms, privileges, and entitlements that individuals and communities require to live a life of dignity. These human rights include the rights to food, housing, health, education, cultural identity, and more.	Affected Communities – The loss of access to land could potentially include economic development.	The LRP has identified the Project Affected Persons who are to be impacted from the land-access restrictions. No additional human rights risks have been identified that are connected to economic, social and cultural development (see below under Human Rights category: Land and resettlement)	**Low**	See below under Human Rights category: Land and resettlement	**Low**	Standard controls: Livelihood Restoration Plan
Right to participate in the cultural life of the community: The right to take part in cultural life guarantees the right of everyone to access, participate in and enjoy culture, cultural heritage and cultural expressions.	Affected Communities – The loss of access to land could influence people's rights to participate in cultural rights	The LRP has identified the Project Affected Persons who are to be impacted from the land-access restrictions. No additional human rights risks have been identified to the right to participate in the cultural life of the community (see below under Human Rights category: Land and resettlement)	**Low**	See below under Human Rights category: Land and resettlement	**Low**	Standard controls: Livelihood Restoration Plan
Human Rights category: Land and resettlement						
The right to property ownership: The right obliges the State to enable citizens to have the right to enjoy private property (land, structures and other assets) without the fear or expropriation being undertaken in a way that does not provide them with adequate notice and compensation.	Affected Communities – The loss, or loss of access to, privately held land and assets could impact the health, wellbeing and economic livelihoods of affected persons.	Article 29 of the Constitution (Right to Property: IV) states that no-one may be deprived of his/her property without a court decision. The outright confiscation of property is prohibited. The expropriation of property for the needs of the state may be permitted only on condition of fair compensation in advance in accordance with the Law on "Acquisition of Lands for State Needs".	**High**	**Scale:** Low. Within a 5km distance from the outer boundary of the Project Area, there are 16 farmers using land informally. Out of the 16 farmers, 4 have produced written agreements between themselves (or another party they claim to represent) and the Ministry of Agriculture. The written agreements include coordinates of agricultural land which they claim to have access to, and these areas overlap, to various extents, the Project Area. The extent of overlap is 1.7%, 1.8%, 13.7% and 30.5%. None of these written agreements are legally valid. To address human rights risks from land and resettlement, a Livelihood Restoration Plan has been prepared in accordance with national legislation and Lender requirements. **Scope:** Individuals (farmers and herders) and their respective households could be affected. The Livelihood Restoration Plan has identified a total of 11 farmer Project Affected Households (PAHs) and 14 herder PAHs **Remediability:** To address impacts arising from economic displacement SPV has prepared a Livelihood Restoration Plan. **Likelihood:** Low. Whilst impacts to farmer's and herder's livelihoods are expected to occur these can be adequately addressed through implementation of the Livelihood Restoration Plan.	**Low**	Standard controls: • Livelihood Restoration Plan
Compensation and the right to an adequate standard of living: Compensation should be calculated at full replacement cost which does not take into consideration the depreciation of structures and other non-land assets. Affected persons have the right to be compensated prior to land access restrictions being imposed and be provided with additional measures to	Affected Communities – The resettlement of affected persons has the potential to result in long-term changes to mental health and wellbeing of the household, standards of living and livelihood status.	Under the Civil Code (Articles 246, 247, 248 and 249) the Decree on acquisition of lands for state needs should be registered in a state real estate registration office. The Executive Agency should: (a) send official notifications to all affected persons about land acquisition; (b) pay full compensation to the affected persons within 90 days after the transaction agreement made in advance of relocation; (c) assist relocated people; and (d) pay compensation for affected assets on the market rates. The principle of 'full replacement cost' is not adopted as market rates are used which take into consideration the physical depreciation of assets. The outcome of the valuation report is subsequently increased by 20% for residential buildings (to reflect any loss of income and the reconnection of utilities) in accordance with Decree of the President No. 506-3 QD dated 7 December 2007.	**High**	**Scale:** Low. A detailed survey of the Project Area has indicated that there are no physical assets of any type (such as a structure or artificial drainage feature for example) present. On this basis, the Project's economic displacement is limited to the loss of area available within the Project Area for animal grazing activities. **Scope:** Individuals (farmers and herders) and their respective households could be affected. The	**Low**	Standard controls: • Livelihood Restoration Plan

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maintain their standard of living and livelihood. Such measures include the provision of in-kind compensation rather than cash, practical support (including legal advice and relocation allowances), transitional support, livelihood restoration measures and the ability to raise a grievance.		Article 16 of the Law on Land Lease (1998) states that when the leased land is acquired for state needs, another land plot having a same size and a same quality can be provided to lessee. Losses incurred in this land shall be paid in accordance with the legislation.		Livelihood Restoration Plan has identified a total of 11 farmer PAHs and 14 herder PAHs. **Remediability:** To address impacts arising from economic displacement SPV has prepared a Livelihood Restoration Plan. **Likelihood:** Low. This human rights risk can be addressed through standard control measures that are applied using SPV's ESMS.		
Compensation in the context of gender and vulnerability: Impacts arising from resettlement may be disaggregated by gender and vulnerability status due to a complex combination of cultural issues where land-related agreements are typically undertaken by men only, educational barriers where women are less educated than men and less willing to 'have a voice' in households affected by resettlement, and less able to adapt to a new place of living or livelihood once land access restrictions have been imposed by the Project.	Affected Communities – Resettlement impacts may be disproportionally experienced by women and vulnerable people.	In a resettlement context, there are no specific provisions to provide vulnerable people or women with additional support under national legislation. Support is provided at a general level to disabled people (refer to the category below).	**High**	**Scale:** Economic displacement arising from the Project has the potential to disproportionately impact vulnerable people. **Scope:** Individuals (farmers and herders) and their respective households could be affected. The Livelihood Restoration Plan has identified a total of 33 vulnerable people amongst the 11 farmer PAHs and 32 vulnerable people amongst the 14 herder PAHs. **Remediability:** Preparation of the Livelihood Restoration Plan has involved detailed engagements with women of farmer and herder households. The Livelihood Restoration Plan includes a budget that aims to specifically provide additional support to vulnerable people, commits to a range of future stakeholder engagement activities with women, and will include a range of livelihood restoration measures that are specifically designed to address women's livelihood priorities. These specific measures need additional engagement with women for their design and future implementation. **Likelihood:** Low. In principle, impacts from economic displacement could occur to women and vulnerable people and these have been identified in the LRP. However, the overall severity of the impact is low. This human rights risk can be addressed through standard control measures that are applied using SPV's ESMS.	**Low**	Standard controls • Livelihood Restoration Plan • Gender Management Plan
Right to freedom of movement: Everyone has the right to freedom of movement and residence within the borders of each state. Everyone has the right to leave any country, including his own, and to return to his country.	Workers – as if a temporary construction camp is used then controls may be imposed on the worker's ability to leave the camp during non-working hours.	it is not currently clear whether a temporary camp is to be used, or not. If a worker camp is used to provide accommodation to the non-local workforce then worker's movements are not expected to be restricted and they will be free to leave the camp during non-working hours.	**Low**	**Scale:** Low as this applies to just the non-local workforce. **Scope:** Individual workers could be impacted. **Remediability:** The non-local workforce will be able to leave the camp during non-working hours. This will not be restricted. **Likelihood:** Low, as the non-local workforce will be able to depart form the camp (if a camp is used) during non-working hours. Their movement will not be restricted.	**Low**	Standard controls • Human Resources Policies and Procedures • Construction Labour and Working Conditions Management Plan • Worker Grievance Mechanism
Human Rights category: Group Rights/Heightened Risk of Vulnerability						
Children's Rights: The Convention on the Rights of the Child establishes global standards to ensure the protection, survival, and development of all children, without discrimination.	Workers and Affected Communities – The employment of children, or the forcing of parents to work excessive hours, will impact the welfare rights of children.	Specific protections are included in legislation to protect the well-being of children including the Law "On guarantees of the rights of the child" (No. 3РУ-139 07.01.2008) and law "On the Protection of Children from Information Harmful to Their Health" (No. 3РУ-444 09/08/2017). Azerbaijan has one of the highest imbalances on male/females in the world, with 114 boys for every 100 girls. In 2020 the approved an Action Plan on the prevention of gender-biased sex selection for the period of 2020-2025. The Action Plan combines a series of important activities	**Low**	**Scale:** Low as remote working will only apply to the non-local workforce which is estimated to be 50% of the total construction workforce (420 personnel) reflecting a potential 210 workers who work remotely.	**Low**	Standard controls • Human Resources Policies and Procedures • Contractor and Supplier Management Plan

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		and measures to be implemented over the next 5 years by local authorities and institutions to address the phenomenon of son preference and promote the value of a girl child[4].		**Scope:** Individual children and their household could be affected from human rights abuses associated with long working hours. **Remediability:** The incoming, non-local workforce will be provided with details of the terms of their employment prior to them accepting the role so that they are fully aware of worker accommodation arrangements, working periods and the time they are expected to attend the workplace on consecutive days without a break. **Likelihood:** Low, as it is common for workers to work away from home in Azerbaijan and it will be clear to workers, before they accept the contract, that they will be based away from home for extended periods of time. This human rights risk can be addressed through standard control measures that are applied using SPV's ESMS.		• Construction Labour and Working Conditions Management Plan • Gender Management Plan
Disability Rights: The Convention on the Rights of Persons with Disabilities promotes global standards intended to protect the rights and dignity of people with disabilities in and outside of the workplace.	Workers – Discrimination in the workforce against the employment of people with disabilities impacts the rights of the disabled.	There is specific national legislation that protects the general welfare of disabled people reflected by Law of 31 May 2018 No. 1153-VQ "About the rights of persons with disability". The law prohibits discrimination to disabled people in the workplace. According to the United States Azerbaijan 2020 Human Rights Report, employers generally hesitated to hire persons with disabilities, and workplace access to disabled people remains very limited.	**Low**	**Scale:** Low as impacts to the rights of the disabled will only occur through land and resettlement-related impacts. **Scope:** Individuals and their household could be affected. Two disabled persons have been identified within 2 farmer PAHs. **Remediability:** The Livelihood Restoration Plan has identified the presence of disabled people in the PAHs and has identified them as being vulnerable. The Worker Code of Conduct shall prevent discrimination in the workplace to disabled people. **Likelihood:** Low, as the Project will be able to prevent discrimination in the workforce to disabled people through the measures described above. This human rights risk can be addressed through standard control measures that are applied using SPV's ESMS.	**Low**	Standard controls: • Human Resources Policies and Procedures • Worker Code of Conduct • Livelihood Restoration Plan
Indigenous peoples / migrants rights / ethnic minorities / migrants Rights: The International Convention on the Protection of the Rights of All Migrant Workers and Members of their Families establishes how migrant workers, and their families should be protected.	Workers – Migrant works from elsewhere in the country or from a neighbouring country, including refugees, may be present in the direct and contracted workforce, and may be subjected to different working conditions due to their migrant status.	The Migration Code (02 July 2013) was established to provide a framework for the implementation of state policy on migration issues, and to regulate migration processes and the legal status of foreigners and stateless persons in Azerbaijan. In addition to general provisions, the Code includes rules on the entry and exit from the territory, documentation required for legal labour migration, the legal status of foreigners and stateless persons in Azerbaijan, and expulsion of foreigners and stateless persons from the territory. Able-bodied foreigners and stateless persons over 18 years old can work in Azerbaijan after obtaining a work permit; permits are typically issued with a legal validity of 1 year or less. Irregular migration to Azerbaijan is the act of foreigners entering Azerbaijan, without government permission and in violation of the given nationality law, or staying beyond the termination date of a visa, also in violation of the law. Deporting irregular migrants is regulated by the Code of Administrative Offences, Code of Execution of Punishments of the Republic of Azerbaijan and the Code on Migration. There are no indigenous peoples, migrants or ethnic minorities amongst the Project Affected Persons identified in the LRP.	**Low**	**Scale:** Medium as approximately half of the Project's workforce during construction are expected to be from outside of the Project Area. **Scope:** Individuals and their household could be affected by human rights abuses. **Remediability:** Screening of all primary suppliers to understand their internal controls to ensure workers are treated equally, irrespective of their origin, ethnicity or other difference, and the actions they take to monitor the presence of migrants within their own, internal supply chain companies. SPV and their EPC Contractor to only work with approved suppliers. **Likelihood:** Low as whilst there is the potential for non-local workers to be considered as 'migrants' to the area even if they are citizens, this human rights risk can be addressed through standard control measures that are applied using SPV's ESMS.	**Low**	Standard controls: • Human Resources Policies and Procedures • Worker Code of Conduct • Worker Grievance Mechanism • Contractor and Supplier Management Plan • Construction Labour and Working Conditions Management Plan

[4] United Nations Population Fund. Azerbaijan adopts Action Plan to combat gender-biased sex selection. 03 March 2020. Available at: https://azerbaijan.unfpa.org/en/news/azerbaijan-adopts-action-plan-combat-gender-biased-sex-selection [accessed 19 February 2022].

Human Rights Issue	Risk to workers and/or Affected Communities?	Human Rights Context in Azerbaijan and the Project Area	Inherent risk level (High or Low)	Human Rights Scan Assessment: Scale: High, Medium or Low Scope: Individual, household, community, region Remediability: Steps that could be taken to address the risk before the harm occurs. Likelihood: High, Medium or Low	Residual risk level (High or Low)	Proposed mitigation through implementation of Project plans and procedures
Women's Rights: The Convention on the Elimination of all Forms of Discrimination Against Women exists to promote women's rights and their protection.	Workers – There is the potential for women to be subject to discrimination, harassment and be provided with lower working conditions compared with men. Affected Communities – Women in local communities may be less willing to raise a grievance or apply for a temporary job.	The Constitution (adopted in November 1995) required gender equality and there is specific legislation including the "Law on Guarantees of Gender Equality" dated October 2006. There is a National Action Plan for Combating Domestic Violence in the Republic of Azerbaijan for 2020-2023 which was approved by a Decree on 27 November 2020. There are no civil society organisations that specifically support the interests of women in the Project Area.	**Low**	**Scale:** High as discrimination or harassment in the workplace could have significant impact on an individual's wellbeing. **Scope:** Individuals could be affected from human rights abuses. **Remediability:** Workers will be required to agree to comply with the Worker Code of Conduct that will prohibit any form of discrimination or harassment in the workplace and ensure that the workplace is suitable for the presence of women and different ethnic groups. SPV will actively encourage women to apply for temporary employment positions during construction, in accordance with the Labour Management Plan and Livelihood Restoration Plan (this provided preferential access to people (including women) from farmer and herder PAHs). SPV and their EPC Contractor to only work with approved suppliers. **Likelihood:** Low, as the Project will be able to prevent discrimination in the workforce through the measures described above. This human rights risk can be addressed through standard control measures that are applied using SPV's ESMS.	**Low**	Standard controls: • Human Resources Policies and Procedures • Worker Code of Conduct • Worker Grievance Mechanism • Contractor and Supplier Management Plan • Construction Labour and Working Conditions Management Plan • Livelihood Restoration Plan • Gender Management Plan

8 Disclosure and Communication

The purpose of this section is to describe the means, tools, frequency and responsible parties that will communicate the Project's human rights risks and mitigation measures to external parties including affected workers, workers, and other stakeholders.

The following will be implemented:

- Prior to the start of construction SPV will disclose and advertise its Human Rights Policy. This will be the responsibility of the SPV E&S Department Manager who shall be supported by the SPV Community Liaison Officers. A copy of the policy document shall be included on the country's website, and a hard copy version (in Azeri) shall be posted on a notice board established at the entrance of the site.
- The LRP Committee shall be provided with capacity building activities before the start of LRP implementation, to ensure that members are aware of the of the findings of the Human Rights Risk Assessment Scan, and reference will be made to the various plans and procedures that comprise the ESMS. This shall be led by the SPV E&S Department Manager who shall take the lead in the formation of the LRP Committee and provision of capacity building activities.
- A short summary reflecting the outcome of the HRRA shall be made publicly available (in Azeri) upon request to stakeholders who wish to obtain additional information.

9 Summary

The results of the Human Rights Risk Assessment have not identified any 'High' risks which require further investigation and detailed assessment.

The Human Rights Risk Assessment references a number of management plans that will be prepared to support the implementation of the ESMS. Management plans consist of a combination of operational policies, procedures and practises. These plans will provide a system against which to monitor and audit environmental and social performance. In addition, they will detail the practical methods required to ensure work is completed in accordance with current best practice, the mitigation measures in the ESIA and legislative and regulatory requirements.

The construction management plans are anticipated to include (but not be limited to):

- Site Mobilisation Plan.
- Labour and Working Conditions Management Plan
- Human Resources Policies and Procedures.
- Workers' Code of Conduct.
- Worker Grievance Mechanism.
- Construction Environmental Management Plan.
- Worker Accommodation Management Plan.
- Stakeholder Engagement Plan.
- Community Grievance Mechanism.
- Contractor and Supplier Management Plan.
- Security Personnel Code of Conduct
- Security and Human Rights Management Plan
- Emergency Preparedness and Response Plan.
- Occupational Health and Safety Plan.
- Hazardous Materials and Waste Management Plan.

- Biodiversity Management Plan.
- Worker Accommodation Management Plan
- Livelihood Restoration Plan
- Community Development Plan
- Gender Management Plan
- Traffic and Transportation Management Plan.
- Emergency Preparedness and Response Plan

A variety of operational management plans shall be prepared, in advance of the start of operations and these documents shall take into consideration any lessons learned gained from the construction stage of the Project.