Lightsource Holdings 2 Limited (Lightsource bp)

Project Sunrise, Azerbaijan

Environmental and Social Impact Assessment

Executive Summary

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RSK GENERAL NOTES

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ABBREVIATIONS

Term	Definition
AC	alternating current
AIS	alien invasive species
ALARP	as low as reasonably possible
ANAMA	Azerbaijan National Agency for Mine Action
AOI	area of influence
BID	background information document
bp	bp Exploration (Caspian Sea) Limited
CCRA	climate change risk assessment
CCTV	closed-circuit television
CH	critical habitat
DC	direct current
EHS	environment, health and safety
EIA	environmental impact assessment
EP4	Equator Principles
EPC	engineering, procurement and construction
ERW	explosive remnants of war
ES	ecosystem services
ESIA	environmental and social Impact assessment
ESMF	environmental and social management framework
ESMP	environmental and social management plan
ESMS	environmental and social management system
EZER	East Zangezur Economic Region
GHG	greenhouse gas
GIIP	good international industry practice
HSE	health, safety and environment
IFC	International Finance Corporation
KII	key informant interview
Lightsource bp	Lightsource Holdings 2 Limited
LV/MV	low to medium voltage
MENR	Ministry of Ecology and Natural Resources
MV/HV	medium to high voltage
OHL	overhead line
PAC	project affected community
PS	(IFC) Performance Standard
PV	photovoltaic
RSK	RSK Environment Ltd.
TCFD	Task Force on Climate-Related Financial Disclosure
WRI	World Research Institute

Unit	Definition
ha	hectare
MW_{AC}	megawatt alternating current
MW_P	megawatt peak

EXECUTIVE SUMMARY

1.1 Background

Lightsource Holdings 2 Limited (Lightsource bp) are acting as the developer on behalf of bp Exploration (Caspian Sea) Limited (bp), under a cooperation agreement with the Government of Azerbaijan, to establish Project Sunrise (the project), a photovoltaic (PV) power facility in the Jabrayil district, within the East Zangezur Economic Region (EZER) of southwestern Azerbaijan.

The PV power facility will occupy an area of approximately 802 hectares (ha) and will have a capacity of 240 megawatt alternating current (MW_{AC}) (generation capacity), approximately 288 megawatt peak (MW_P). The project comprises the design, supply, construction, installation, commissioning and operation of the 240 MW_{AC} PV power facility.

Project Sunrise represents a key piece of renewable power-generating infrastructure which will improve the provision of mains power to resettling communities within the Jabrayil region and across the EZER.

RSK Environment Limited (RSK), a subsidiary of RSK Group, has been appointed by Lightsource bp to prepare the environmental and social impact assessment (ESIA) report for review and approval by the Ministry of Ecology and Natural Resources (MENR) of Azerbaijan.

1.2 Scoping Stage

The Republic of Azerbaijan's 'Law of the Republic of Azerbaijan on Environmental Impact Assessment, June 12, 2018' includes the requirement for preliminary consultations with the MENR to determine the content, scope and methods of the ESIA in advance.

The results of the ESIA scoping report and baseline surveys were presented to the MENR in Baku during a meeting on 25 September 2023 as part of the ESIA process. The MENR confirmed that the approach to the scoping process presented was acceptable and the study could proceed to the ESIA stage. MENR also provided feedback on the proposed process which is addressed within this ESIA.

1.3 Regulatory Framework

The ESIA for Project Sunrise will conform to the Republic of Azerbaijan's EIA legislation that requires ESIA studies to be reviewed and approved by the MENR in respect of any project of economic or strategic importance and planning for the development of regions and individual economic areas.

As well as Azerbaijani national regulations, the ESIA will ensure compliance of the project to the applicable Equator Principles IV (EP4) (2020), the International Finance Corporation (IFC) Performance Standards (PS) 1-8 on Environmental and Social Sustainability (2012), and the World Bank Group Environmental, Health and Safety (EHS) Guidelines ('General' EHS Guidelines and 'Industry Sector' EHS Guidelines) (2007).

1.4 Project Description

Project Sunrise will comprise the following components.

- PV modules attached to mounting frames (made of either galvanised aluminium or steel) to form tables (“arrays”) (the current base case uses a single axis tracking system to mount the solar PV modules).
- Low to medium voltage (LV/MV) substations which will house electrical equipment, including a transformer, switches and circuit breakers, used to control and distribute electrical power in a localised area or grid.
- Inverters, adjacent to the LV/MV substations which will convert direct current (DC) electricity to alternating current (AC) electricity for the grid.
- Storage containers for materials and portacabins for welfare/office areas.
- A control house, with an associated weather station and communications equipment.
- Underground cables and a cable (underground or an overhead line (OHL)) connecting the two sites.
- Security fencing around the site perimeter, with access gates included.
- Internal access tracks within the site.
- Closed-circuit television (CCTV) and site security systems.

The project will be connected to the step-up MV/HV substation, located within the project area. AzerEnerji is responsible for the construction/commissioning of this step-up MV/HV substation including all the main equipment such as the power transformers.

Figure 1.1 presents the location and overview of the project site and Figure 1.2 illustrates the proposed Project Sunrise base case.

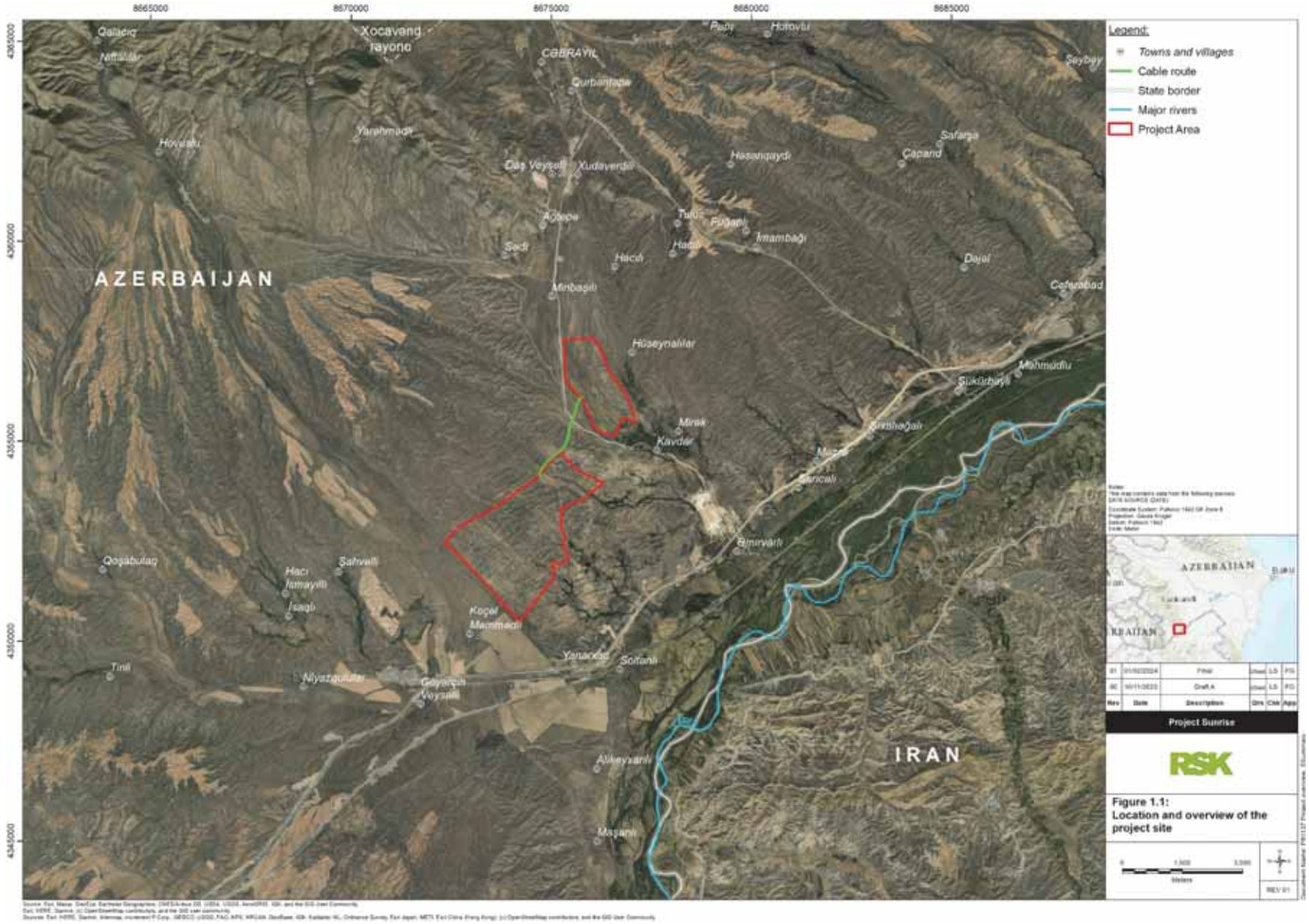

Figure 1.1: Location and overview of the project site

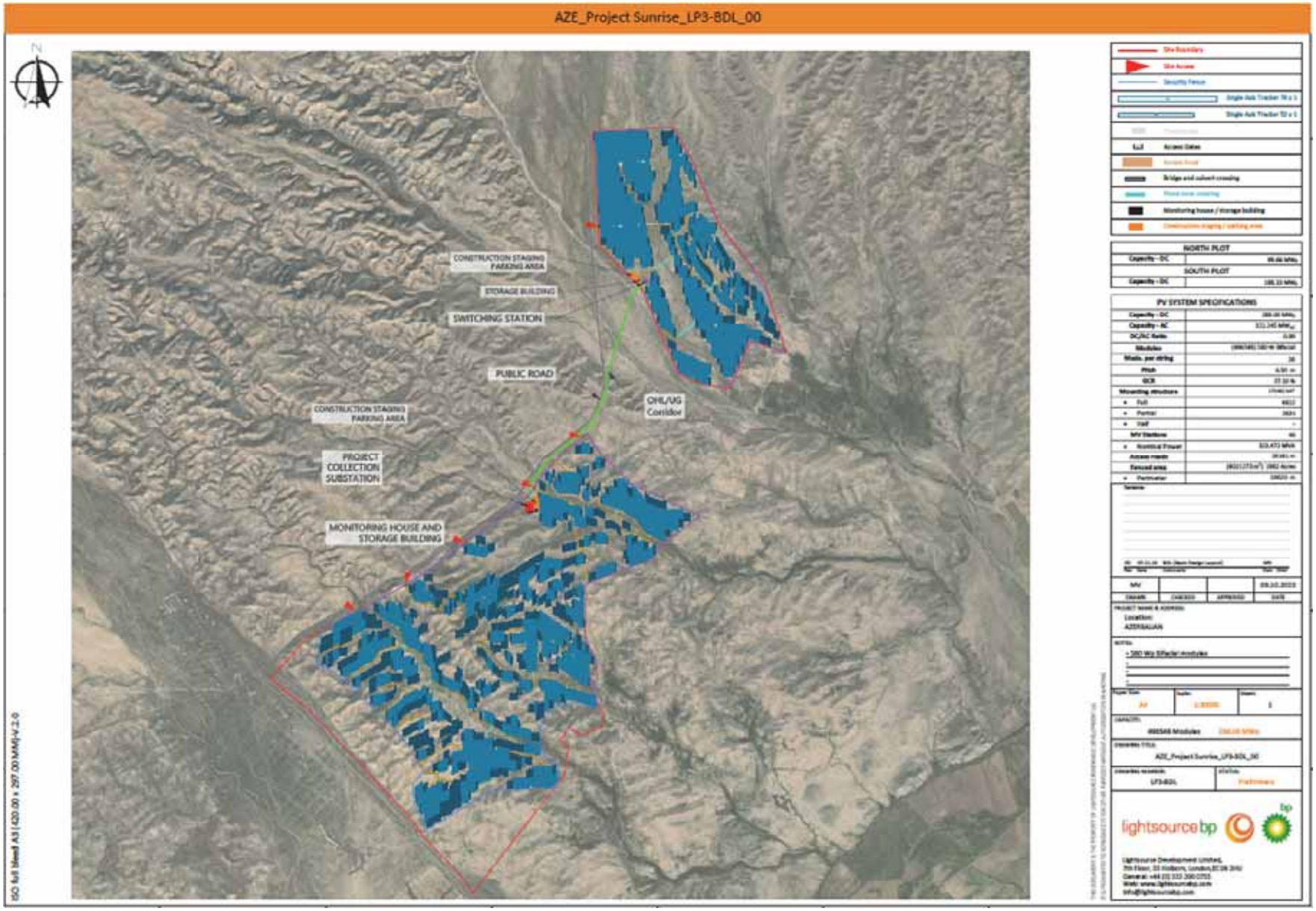

Figure 1.2: Project Sunrise – 288 MW_P/240 MW_{AC} base case

1.5 Project Phases

1.5.1 Construction and Commissioning

At the time of writing this ESIA report, the mobilisation, site preparation, construction and commissioning programme is expected to begin in the second half 2024 and is expected to take approximately 18 months to complete. The main activities to be undertaken within the PV power facility are listed below.

- Site preparation:
  - temporary fencing of the site
  - vegetation clearance (for laydown areas, construction facilities, inverters etc.)
  - earthworks, including ground levelling (cut and fill), installation of drainage ditches, trenching for cables and construction of internal site roads. Use of excavated material will be maximised within the site and the use of imported material or disposal of excavated material offsite will be minimised.
- PV power plant installation:
  - import of components to site
  - installation of foundations and mounting structures
  - installation of solar panels
  - installation of other equipment (inverters, transformers).
- Commissioning of the PV plant:
  - mechanical and visual inspection
  - electrical and equipment testing
  - commencement of electricity supply.
- Site clean-up and reinstatement of temporary construction areas.

The construction and commissioning activities are described in detail in Section 3 of the ESIA.

1.5.2 Operation

The operation and maintenance of the PV power facility will be mainly restricted to daylight hours. With automated functions of inverter and switchyard controllers, the maintenance will be mostly oriented towards upkeep and monitoring of the overall performance of the system to get maximum energy from the facility. Maintenance during the operation phase is likely to include servicing of equipment, cleaning of solar PV modules and general upkeep of the site territory.

1.5.3 Decommissioning

With appropriate proactive monitoring and maintenance regimes in place, the PV modules are expected to work efficiently and economically well beyond the 35-year performance warranty period. The decommissioning or upgrading of the infrastructure has not been discussed in detail in the ESIA report but will be addressed before required in the form of a decommissioning management plan.

1.6 Utilities and Resource Consumption

1.6.1 Power Supply

Energy supply for construction needs will be either from the national grid, or from a diesel generator. Energy from the AzerEnerji substation (point of connection) will be required for hot commissioning. A diesel generator may also be installed for emergency power supply in case of a power outage.

1.6.2 Drainage

A detailed operational drainage design will be carried out pre-construction with the objective of ensuring that drainage of the land is maintained without affecting areas outside of the project boundary. A full flood risk assessment and hydrological assessment will be carried out as part of the technical surveys and this will consider any implications for site drainage.

1.6.3 Resource Consumption

During the peak construction and commissioning period the project will require the following resources in varying quantities: diesel, lubricating oils, hydraulic oils, paint, cleaning agent, cement, sand, gravel, steel and fencing materials.

During construction and operations, water will be sourced offsite from an existing source that has adequate capacity to accommodate the project's water needs.

Contracting and procurement procedures for resources will be fair and equitable. The project will give preferential treatment to the procurement of resources (along with other goods and services) originating from Azerbaijan, when such resources are internationally competitive with respect to quality, availability, price, and performance.

1.7 Transport

Materials, equipment, and personnel will be transported to/from the project sites during the construction and commissioning phase and operation phase of the project. A logistics assessment will be undertaken as part of the project to define the vehicle type and number, and transport routes for the various project requirements will be surveyed. The outcome of the logistics assessment will be communicated to the MENR in due course.

Construction of the PV power facility will require various types of machinery and equipment but the exact types and numbers will be subject to engineer, procure and construct (EPC) contractor selection and in accordance with Lightsource bp's construction standards and requirements.

1.8 Workforce

The workforce is expected to consist of a combination of Azerbaijani nationals and expatriate workers and both groups are expected to be used during the construction, operation and decommissioning phases.

The construction workforce is expected to be 300 persons on average across 6-8 months, reaching 700 persons at peak times. The exact workforce requirements during operation will be determined prior to commissioning and will be defined in the operations and maintenance

contract. Lightsource bp aims to maximise the employment of construction workforce from the local population, subject to final technology selection and skills availability.

Various levels of training and skills development opportunities will be provided to the workforce throughout the project lifecycle to ensure they are able to fulfil their roles and promote ongoing learning and capacity building. This includes training on health, safety, and environment (HSE), labour management and, where required for specific job profiles, vocational training.

All workers will be provided with local employment contracts in accordance with the Labour Code of the Republic of Azerbaijan and based on the duration of their positions.

1.9 Associated Facilities

For the project the only associated facility (as defined in IFC PS 1) identified is the step-up MV/HV substation that will be constructed within the southern cluster. This substation will be constructed and operated by AzerEnerji, but would not be constructed if Project Sunrise was not realised.

Construction, operation, and decommissioning activities associated with the step-up MV/HV substation are therefore assessed in Section 8 of the ESIA.

1.10 Project Alternatives

1.10.1 Site Selection

Lightsource bp conducted a site selection exercise comprising both desktop review and site visits of government proposed sites, considering the following criteria:

- technical suitability criteria
- grid connection feasibility
- planning considerations
- site considerations.

Of the several potential sites assessed, Lightsource bp proceeded with the current Jabrayil locations in line with its international development experience.

1.10.2 Technology Selection

Consideration of alternatives were explored for technology selection (PV module composition, PV module rack mounting systems, single or dual tracking systems and orientation), plant and equipment and concrete provision.

1.10.3 ‘Do Nothing’ Scenario

The ‘do nothing’ scenario is a hypothetical alternative conventionally considered in ESIA as a basis for comparing the development proposal under consideration. In this situation, the do-nothing scenario would comprise not developing the PV power facility. Should the project not move forward, then the significant and crucial positive economic, environmental, and social benefits of the project would not be realised.

1.11 Baseline Conditions

Very little historic data is available for the region and project area of influence (AOI) due to the decades of military occupation by Armenian armed forces of the entire Garabagh region that left behind a landscape of abandoned and completely destroyed settlements and villages and cultural heritage sites. Therefore, a large portion of the baseline data presented has been collected as part of this ESIA by a team of local environmental and social experts.

1.11.1 Environmental and Socioeconomic Baseline

1.11.1.1 Physical and biological environment

Specialist desktop studies were conducted for geomorphology, geology, hydrogeology and geology, which have been used to inform the physical baseline. Additionally, secondary data from freely available online sources was collected for this project and referenced from other studies where available.

The baseline conditions of the biological environment have been determined using a combination of desk-based assessments and field survey data. Literature review, field surveys and data collections were conducted for flora and fauna by local subject matter experts. Seasonal surveys were conducted in May 2023 and October 2023. In addition, a Critical Habitat (CH) screening study was completed by RSK which identifies potential features of biodiversity importance which may occur or exist within the wider project area. Full details of the physical and biological baseline conditions are presented in Section 5 of the ESIA.

1.11.1.2 Socioeconomic environment

The socioeconomic baseline is based on a review of qualitative and quantitative secondary data from various sources to provide contextual information at the national level, as well as primary data gathered at the local and national level during meetings with key stakeholders in the Jabrayil district and Baku in October 2023.

The socioeconomic baseline includes the cultural heritage baseline study, which builds on the desk-top work undertaken for the scoping phase, which included consultation of secondary data sources, and a field survey conducted in May 2023. Full details of the socioeconomic baseline are presented in Section 5 of the ESIA.

1.12 Stakeholder Engagement

The objectives of stakeholder engagement are to raise awareness of the project among the stakeholders and to understand their concerns and recommendations so that these can be considered in the overall ESIA. The process is also used to facilitate data collection activities for the socio-economic baseline, through key informant interviews (KII). These meetings are used to help develop a more comprehensive understanding of the project's AOI, enable accurate identification of vulnerable groups, and conduct data collection activities with key stakeholders.

1.12.1 Stakeholder Identification and Analysis

Desktop research identified potential stakeholders within the categories of relevant authorities, civil society, academia, business and project affected communities/groups, and a preliminary list of ESIA stakeholders was developed. Once stakeholders had been identified, stakeholder

analysis was undertaken to understand their likely relationship with the project and therefore the most appropriate engagement strategies for them.

1.12.2 Stakeholder Engagement Activities Undertaken

1.12.2.1 Scoping phase

The scoping phase verification exercise was limited to consultation with representatives of Azerbaijan National Agency for Mine Action (ANAMA) in Jabrayil District, who facilitated a site walkover. The purpose of this site visit was to obtain understanding of local environmental and social context and identify possible constraints associated with the project.

1.12.2.2 ESIA phase

A total of 14 meetings were carried out during the ESIA phase. A background information document (BID), frequently asked questions document and questionnaire guide were used to share project information and facilitate the meetings. Meetings were held in Azerbaijani and the BID (in Azerbaijani) was provided to all stakeholders.

The stakeholder engagement activities were linked to the socioeconomic data collection process, which focused on gathering relevant information at the national level (meaning authorities and agencies with mandates covering the entire country) and the district/local level (meaning stakeholders involved in the administration/operation of districts, and local service providers).

During this phase, additional identified stakeholders that were not engaged in the scoping phase were met to inform them about the project and to receive their comments, which have been included in the ESIA.

1.12.3 Analysis of Stakeholder Feedback

Generally, stakeholders were supportive of the project and provided positive feedback. Stakeholders identified several economic and environmental benefits of the project and recognised the potential of the project to contribute to development in the EZER. Questions and comments relating to their mandate/area of interest and expertise were typically raised. In general, the most common interventions across all meetings were employment related, followed by questions and comments about the project characteristics and health and safety aspects.

1.12.4 Grievance Management Procedure

Grievances raised by stakeholders in relation to the project and the ESIA process will be managed in accordance with the Grievance Management Procedure. During the ESIA phase stakeholders are able to submit their comments, concerns or grievances via an email address, which will then be entered into a grievance log and the response and resolution process will be managed by Lightsource bp.

1.12.5 Ongoing Engagement

Further stakeholder engagement meetings will be held during the public disclosure phase of the ESIA with the aim of ensuring that stakeholders are informed of and comprehend the outcome of the draft ESIA, in particular the identified impacts and mitigation measures. A draft of the ESIA document has been prepared for public disclosure. It will be disseminated widely for comment prior to formal submission to the Government and a public meeting held to present the ESIA.

Stakeholders will be able to provide comments and questions on the draft ESIA report that will then be addressed in the final version.

1.13 Impact Assessment Methodology

A detailed methodology for assessing the environmental and socioeconomic impacts associated with planned activities (magnitude vs. sensitivity) and unplanned (likelihood vs. severity) from construction, operations and decommissioning phase activities of the project was followed. The methodology considered the potential impacts on the physical environment (air quality, greenhouse gas (GHG), noise, soil, groundwater, surface water, landscape and traffic and transportation), the biological environment (terrestrial and aquatic habitats, flora and fauna) and the socioeconomic environment.

The assessment of planned activities and unplanned events was carried out on the assumption that good international industry practice (GIIP) have been applied. As per GIIP, project-specific mitigation measures are required for significant negative impacts only. The main goal of this process is to reduce impact significance to levels that are ‘as low as reasonably practicable’ (ALARP).

A GHG assessment was undertaken, following the guidelines of the Institute of Environmental Management and Assessment.

A climate change risk assessment (CCRA) was undertaken in line with guidance from EP4.

An ecosystem services (ES) analysis was undertaken in accordance with the World Resources Institute (WRI) guidance ‘Weaving Ecosystem Services into Impact Assessment’.

1.14 Impact Assessment

1.14.1 Impact Assessment for Planned Activities

The summary of the environmental impact assessment for planned activities during the construction and commissioning, operations and decommissioning phase is summarised in Table 1.1. A summary of the social impact assessment for planned activities is provided in Table 1.2.

These tables include an overview of the activity, potential impact, magnitude of impact, sensitivity of impact, overall pre-mitigation impact significance, whether mitigation measures are required, and the residual impact significance after implementation of additional mitigation measures.

The management control measures and mitigation measures have been identified and compiled into the commitments register (see ESIA Appendix 6). The commitments register also considers which project phase the management control measures and mitigation measures apply to, the responsible party and whether performance monitoring is required.

1.14.2 Impact Assessment for Unplanned Activities

A summary of environmental and socioeconomic unplanned events associated with the project during the construction and commissioning, operations and decommissioning phase is presented in Table 1.3. These tables include an overview of the activity, environmental or social aspect, potential impact, project phase, severity of impact, likelihood of impact, overall risk ranking and the required mitigation measures.

1.14.3 Cumulative Impact Assessment

Cumulative impacts have been identified and assessed in accordance with the 'IFC Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets' (2013).

Potential cumulative impacts are predicted between the construction and operation of Project Sunrise and the following third party projects:

- MV/HV substation (AzerEnerji)
- gas pipeline connecting Horadiz and Lachin (SOCAR)
- Araz Valley Economic Zone Industrial Park
- reconstruction and resettlement of Jabrayil city and the villages of Şűkűrbeyli, Horovlu, Sarıcalı, Maşanlı, Böyűk Mercanlı, Karxulu, Cocuq Mercanlı and Mehdili before 2026.

No significant environmental or social cumulative impacts were predicted.

1.14.4 Ecosystem Services

Ecosystem services have been identified and defined in accordance with IFC PS 6. For this project a different approach has been taken in that the analysis of ES considered the potential future project affected communities (PACs) to align with the State Program on the Great Return. No immediate significant impacts were identified due to the absence of beneficiaries of ES during the construction and early years of operation of the PV power facility. However, best practice mitigation measures are proposed to protect the identified ES for any future beneficiaries.

1.15 Climate Change Risk Assessment (CCRA)

A CCRA in accordance with the requirements of EP4 was conducted, considering all climate related risks over the expected economic lifespan of the project (approximately 35 years). The CCRA presents a high-level analysis related to the physical risks of climate change as defined by the Task Force on Climate-Related Financial Disclosure (TCFD).

Key potential impacts were identified resulting from the following climate hazards, for which risk mitigation (adaptation) measures were recommended:

- temperature increase and increase in days over 35°C
- river flooding
- landslides and wildfires.

1.16 Environment and Social Management Framework (ESMF)

An ESMF has been developed that provides an overview of the approach to the environmental and social management processes during the various phases of the project, including construction, operation and decommissioning. It outlines the key processes implemented by Lightsource bp to manage the environmental and social impacts and benefits and is a tool for the implementation of the commitments identified in the ESIA and subsequent commitments registers. The ESMF describes how these processes are organised into an environmental and social management system (ESMS) including the roles and responsibilities of Lightsource bp and contractors who will undertake the construction, operations and demobilisation activities for the project.

The ESMF includes the management and monitoring of potential cumulative impacts where Lightsource bp will use commercially practicable efforts to engage relevant government authorities, other developers and other relevant stakeholders, in the implementation of coordinated mitigation measures to manage the potential cumulative impacts.

Further details can be found in the ESMF included as Section 10 of the ESIA. The ESMF and ESMS are live documents and are updated as the project progresses.

Table1.1: Summary of environmental impacts

No.	Project activity	Description of impact	Pre-mitigation scoring			Mitigation measure(s) proposed[1]	Residual impact scoring		
			Magnitude of impact	Receptor sensitivity	Impact significance		Magnitude of impact	Receptor sensitivity	Impact significance
Construction phase									
1	PV power facility enabling works activities	Increased dust emissions	High (4)	Low (2)	Moderate (8)	Y	No significant residual impacts		
2	PV power facility construction activities	Increased dust emissions	Low (2)	Low (2)	Minor (4)	N			
3	Track-out activities	Increased dust emissions	High (4)	Low (2)	Moderate (8)	Y	No significant residual impacts		
4	Use of construction equipment, vehicles and diesel generators	Increased exhaust emissions	Low (2)	Low (2)	Minor (4)	N			
5	Embodied emissions from infrastructure, primarily the solar PV modules	Increase in GHG emissions	Low (2)	High (4)	Moderate (8)	Y	Very Low (1)	High (4)	Minor (4)
6	PV power facility enabling works activities	Noise disturbance	Very Low (1)	High (4)	Minor (4)	N			
7	Installation of solar PV modules and associated facilities	Noise disturbance	Very Low (1)	High (4)	Minor (4)	N			
8	Repeated vehicle movements	Compaction and changes to soil structure	Low (2)	Low (2)	Minor (4)	Y	Very Low (1)	Low (2)	Negligible (2)
9	PV power facility enabling works and construction activities	Erosion and soil loss	Low (2)	Low (2)	Minor (4)	Y	Very Low (1)	Low (2)	Negligible (2)
10	Disturbance of contaminated soil during construction	Mobilisation of contamination	Low (2)	Low (2)	Minor (4)	Y	Very Low (1)	Low (2)	Negligible (2)
11	PV power facility construction activities	Localised dewatering of groundwater	Very Low (1)	Low (2)	Negligible (2)	N			
12	Management of solid and liquid waste	Groundwater contamination	Low (2)	Low (2)	Minor (4)	Y	Very Low (1)	Low (2)	Negligible (2)
13	Management of solid and liquid waste	Surface water contamination	Medium (3)	Medium (3)	Moderate (9)	Y	Low (2)	Medium (3)	Moderate (6)
14	PV power facility enabling works and construction activities	Surface water contamination	Low (2)	Medium (3)	Moderate (6)	Y	Very Low (1)	Medium (3)	Minor (3)
15	PV power facility enabling works and construction activities	Changes in surface water drainage	Very Low (1)	Medium (3)	Minor (3)	N			
16	Visual disturbance during construction activities e.g.., vegetation clearance, enabling works, presence of people, equipment and vehicles	Visual amenity and changes in landscape character	Very Low (1)	Very Low (1)	Negligible (1)	N			
17	Transport of people and equipment	Increased construction vehicular traffic	Very Low (1)	Very Low (1)	Negligible (1)	N			
18	PV power facility construction activities	Exploitation or illegal logging pressures on protected areas	Very Low (1)	Medium (3)	Minor (3)	Y	Very Low (1)	Medium (3)	Minor (3)
19	Construction of temporary workforce accommodation or catering services	Generalised degradation of surrounding habitats as well as choking hazards to fauna species mistaking waste as food	Medium (3)	Low (2)	Moderate (6)	Y	Very Low (1)	Low (2)	Negligible (2)
20	Clearance of land for construction of the PV power facility	Loss of surface vegetation and native flora	Medium (3)	Medium (3)	Moderate (9)	Y	Low (2)	Medium (3)	Moderate (6)
21	PV power facility construction activities including clearance of surface vegetation	Reduction in water quality in waterways, soil erosion and increased siltation	Low (2)	High (4)	Moderate (8)	Y	Very Low (1)	High (4)	Minor (4)
22	PV power facility mobilisation and construction activities – collection, transportation, handling, storage, and disposal of various types of materials	Reduction in water quality in waterways and habitat degradation	Low (2)	High (4)	Moderate (8)	Y	Very Low (1)	High (4)	Minor (4)
23	PV power facility mobilisation and construction activities – collection, transportation, handling, storage, and disposal of various types of materials	Generational reduction in flora/fauna populations and genetic diversity	Medium (3)	High (4)	Major (12)	Y	Low (2)	Medium (3)	Moderate (6)
24	Construction vehicle and heavy machinery movements	Localised damage to flora	Low (2)	Low (2)	Minor (4)	Y	Very Low (1)	Low (2)	Negligible (2)
25	Clearance and earthworks removing topsoil layer	Loss of fertile topsoil	Medium (3)	Medium (3)	Moderate (9)	Y	Low (2)	Low (2)	Minor (4)
26	Construction activities and HGV movements	Dust, noise and vibrations resulting in avoidance or behavioural changes by mobile fauna species	Low (2)	Low (2)	Minor (4)	Y	Very Low (1)	Low (2)	Negligible (2)
27	Clearance and modification of both natural and modified habitats	Permanent destruction of habitats and subsequent loss or displacement of their native fauna	Low (2)	Medium (3)	Moderate (6)	Y	Very Low (1)	Low (2)	Negligible (2)
28	Construction of any man-made infrastructure	Habitat fragmentation	Medium (2)	Low (2)	Moderate (6)	Y	Low (2)	Low (2)	Minor (4)

[1] Refer to Section 8 of the ESIA for details of proposed mitigation measures

No.	Project activity	Description of impact	Pre-mitigation scoring			Mitigation measure(s) proposed[1]	Residual impact scoring		
			Magnitude of impact	Receptor sensitivity	Impact significance		Magnitude of impact	Receptor sensitivity	Impact significance
Operation phase									
29	Operation of the PV power facility	GHG emissions savings	Positive (0)	High (4)	Positive (0)	N			
30	Operation of the PV power facility	Noise disturbance	Very Low (1)	High (4)	Minor (4)	N			
31	Management of solid and liquid waste	Groundwater contamination	Very Low (1)	Low (2)	Negligible (2)	N			
32	Management of solid and liquid waste	Surface water contamination	Very Low (1)	Medium (3)	Minor (3)	N			
33	Visual disturbance during operations (e.g., presence of site infrastructure)	Visual amenity and changes in landscape character	Low (2)	Very Low (1)	Negligible (2)	N			
34	Transport of people and equipment	Increased construction vehicular traffic	Very Low (1)	Very Low (1)	Negligible (1)	N			
35	Construction of the standing superstructure for PV modules	Opportunities for artificial nesting, roosting and foraging habitat	Positive (0)	Low (2)	Positive (0)	N			
36	Construction of a fence around the project sites	Habitats and artificial structures within the fenced site providing refugia for terrestrial fauna.	Positive (0)	Low (2)	Positive (0)	N			
37	Generation of packaging and food waste	Accumulation of wind-blown litter	Low (2)	Low (2)	Minor (4)	Y	Very Low (1)	Low (2)	Negligible (2)
Decommissioning phase									
38	PV power facility decommissioning activities	Increase in GHG emissions	Very Low (1)	High (4)	Minor (4)	N			
39	PV power facility decommissioning activities	Noise disturbance	Very Low (1)	High (4)	Minor (4)	N			
40	Transport of people and equipment	Increased construction vehicular traffic	Very Low (1)	Very Low (1)	Negligible (1)	N			

Table 1.2: Summary of social impacts

No.	Project activity	Description of impact	Pre-mitigation scoring			Mitigation measure(s) proposed[2]	Residual impact scoring		
			Receptor sensitivity	Magnitude of impact	Impact significance		Receptor sensitivity	Magnitude of impact	Impact significance
Construction phase									
1	Procurement of goods and services	Benefits to local businesses	Positive (0)	High (4)	Positive (0)	N			
2	Procurement of goods and services	Local inflation	Low (2)	Low (2)	Minor (4)	Y	Very Low (1)	Low (2)	Negligible (2)
3	Local sub-contracting, and the purchasing of goods and services	Escalation of potential local corruption	Low (2)	Medium (3)	Moderate (6)	Y	Very Low (1)	Medium (3)	Minor (3)
4	Employment opportunities	Generation of local employment opportunities	Positive (0)	Medium (3)	Positive (0)	N			
5	Employment opportunities	Training and skills development	Positive (0)	Medium (3)	Positive (0)	N			
6	Completion of construction activities	Termination of employment contracts	Medium (3)	Low (2)	Moderate (6)	Y	Very Low (1)	Low (2)	Negligible (2)
7	Project employment	Violation of labour rights by contractors and sub-contractors and in supply chain	Low (2)	Low (2)	Minor (4)	Y	Very Low (1)	Low (2)	Negligible (2)
8	Project employment	Failure of contractors and sub-contractors to provide adequate accommodation	Low (2)	Medium (3)	Moderate (6)	Y	Very Low (1)	Medium (3)	Minor (3)
9	Project security personnel actions and behaviour.	Negative interactions between members of the public and project security personnel.	Very Low (1)	Low (2)	Negligible (2)	N			
10	Physical disturbance during construction	Six cultural heritage finds lie within or close to the boundary of the project footprint	Low (2)	Very Low (1)	Negligible (2)	Y			
11	Physical disturbance during construction	Two cultural heritage finds lie within the boundary of the southern cluster	Low (2)	Medium (3)	Moderate (6)	Y			

[2] Refer to Section 8 of the ESIA for details of proposed mitigation measures

No.	Project activity	Description of impact	Pre-mitigation scoring			Mitigation measure(s) proposed[2]	Residual impact scoring		
			Receptor sensitivity	Magnitude of impact	Impact significance		Receptor sensitivity	Magnitude of impact	Impact significance
12	Physical disturbance during construction	Five cultural heritage finds lie outside of the boundary of the project footprint	Very Low (1)	Low (2)	Negligible (2)	Y			
13	Ground disturbing activities during enabling and construction works	Archaeological or cultural heritage chance find	Low (2)	Low (2)	Minor (4)	Y			
14	Enabling works and construction activities	Elements of enabling works and construction (i.e., transportation) may disrupt access to known cultural heritage sites	Low (2)	Low (2)	Minor (4)	Y			
Operation phase									
15	Project operation	Power generation and supply to national grid	Positive			N			
16	Employment opportunities	Generation of local employment opportunities	Positive (0)	Medium (3)	Positive (0)	N			
17	Disturbance during maintenance works during the operations phase	Two cultural heritage finds lie within the boundary of the southern cluster	Very Low (1)	Medium (3)	Negligible (3)	Y			
Decommissioning phase									
18	Project employment	Provision of local employment opportunities	Positive (0)	Medium (3)	Positive (0)	N			
19	Project employment	Unmet expectations regarding scale of local employment opportunities	Low (2)	Medium (3)	Moderate (6)	Y	Very low (1)	Medium (3)	Minor (3)
20	Project employment	Resentment between those who are employed and those who's applications are unsuccessful	Low (2)	Medium (3)	Moderate (6)	Y	Very Low (1)	Medium (3)	Minor (3)
21	Decommissioning activities	Noise emissions causing nuisance	Low (2)	Low (2)	Minor (4)	Y	Very Low (1)	Low (2)	Negligible (2)
22	Decommissioning activities	Increase in air emissions leading to nuisance and worsening of existing conditions	Low (2)	Low (2)	Minor (4)	Y	Very Low (1)	Low (2)	Negligible (2)
23	Disturbance during decommissioning works	Two cultural heritage finds lie within the boundary of the southern cluster	Very Low (1)	Medium (3)	Negligible (3)	Y			

Table 1.3: Summary of potential impacts during unplanned events

Project activity	Environmental or social aspect	Description of potential impact	Project phase	Impact significance			Mitigation measure(s)
				Severity	Likelihood	Risk ranking	
Potential environmental impacts from unplanned events							
Management of hazardous materials	• Soil quality • Surface water quality • Groundwater quality	Accidental loss of containment or spillage of hazardous materials during storage, handling or use results in contamination of soil and/or water resources.	• Construction • Operation • Decommissioning	Low (2)	Unlikely (2)	**Small**	• GIIP pollution prevention mitigation measures • Develop and implement a Hazardous Materials Management Plan within the ESMP. • Develop and implement a Spill Response Plan within the ESMP.
Storage of hazardous materials and equipment containing hazardous materials (i.e., vehicles and machinery) and hazardous waste	Surface water quality	Flooding events could result in the accidental release of hazardous materials from storage areas, vehicles and machinery and hazardous waste areas should these areas be damaged or submerged by floodwaters resulting in contamination of surface water bodies.	• Construction • Operation • Decommissioning	Medium (3)	Unlikely (2)	**Material**	• Design project site layouts taking into consideration the flood risk assessment study. • Regularly review weather forecasts. • GIIP pollution prevention mitigation measures • Develop and implement a Hazardous Materials Management Plan within the ESMP. • Develop and implement a Spill Response Plan within the ESMP.
Use of vehicles and machinery for project activities	Terrestrial biodiversity	Direct mortality of fauna from collisions with vehicles and machinery.	• Construction • Operation • Decommissioning	Low (2)	Unlikely (2)	**Small**	• GIIP fauna protection measures • Develop and implement a Biodiversity Management Plan within the ESMP.
Mobilisation and construction activities	Terrestrial and aquatic biodiversity	Mobilisation and construction activities involving the collection, transportation, handling, storage and disposal or various types of materials may result in the accidental introduction of invasive or non-native floral or faunal species (alien invasive species (AIS)).	• Construction • Operation • Decommissioning	High (4)	Unlikely (2)	**Material**	• GIIP AIS prevention measures • Develop and implement an AIS Management Plan within the ESMP.

Project activity	Environmental or social aspect	Description of potential impact	Project phase	Impact significance			Mitigation measure(s)
				Severity	Likelihood	Risk ranking	
Potential social impacts from unplanned events							
Use of vehicles and machinery for project activities	• Other road users • Pedestrians	Traffic accidents resulting in material damage, injury or fatality of another road user or pedestrian.	• Construction • Operation • Decommissioning	High (4)	Probable (4)	**Severe**	• Develop and implement a Traffic Management Plan within the ESMP. • Lightsource bp and contractor(s) will develop and implement public safety communications protocols (including awareness building and emergency response) to mitigate risks to communities. • Contractor(s) will undertake a pre-construction survey of the roads to be used by project traffic and identify community hazards. • Lightsource bp and the contractor will monitor Community Grievance Management Procedure for issues and concerns related to traffic management. • Postage of culturally appropriate safety signage and information in communities near project roads.
Use of vehicles and machinery for project activities	Project affected communities	Traffic accidents resulting in material damage to third party property or injury or fatality of livestock.	• Construction • Operation • Decommissioning	Medium (3)	Possible (3)	**Material**	• Develop and implement a Traffic Management Plan within the ESMP. • Lightsource bp and the contractor will monitor Community Grievance Management Procedure • Postage of culturally appropriate safety signage and information in communities near project roads.
Project activities	Workforce health and safety	The potential failure of the contractor(s) and sub-contractors working on the PV power facility to meet requisite occupational health and safety standards increases the risk of unsafe workplaces and conditions that could lead to workplace injuries and/or fatalities.	• Construction • Operation • Decommissioning	Medium (3)	Probably (4)	**Severe**	• Robust contractor pre-qualification and due diligence process that includes a review of contractor's health and safety policies. • Occupational health and safety training will be provided to the entire workforce as part of the induction process. • Lightsource bp and contractor(s) will develop and implement comprehensive Health and Safety Plans.
Mobilisation and construction phase site activities	Workforce and community health and safety	Although the project sites have been surveyed and cleared of ERW and mines by ANAMA there remains a risk that unknown ERW maybe accidently unearthed which could lead to an explosion and cause injury or death to a worker or third party.	• Construction	High (4)	Unlikely (2)	**Material**	• Lightsource bp and contractor(s) will develop and implement an ERW accidental risk mitigation procedure when unidentified ERW is found. • ERW hazard and risk training will be provided to the entire workforce as part of the induction process.