

3 Impact Assessment Methodology

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3.1 Introduction

This Chapter presents a description of the Environmental and Socio-Economic Impact Assessment (ESIA) process adopted for the Shah Deniz 2 (SD2) Project and the methodology used to assess impact significance.

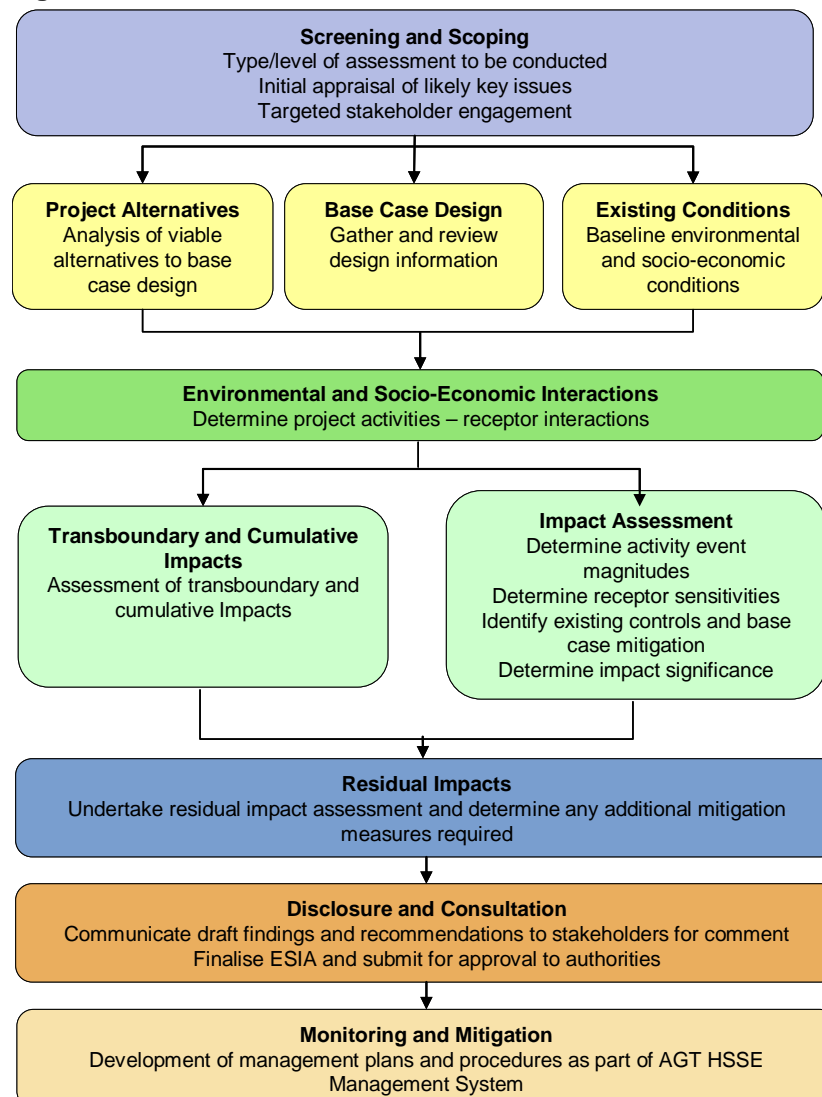
3.2 ESIA Process

The ESIA process constitutes a systematic approach to the evaluation of a project and its associated activities throughout the project lifecycle. The process (refer to Figure 3.1) includes:

- Screening and Scoping;
- Project Alternatives and Base Case Design;
- Existing Environmental and Socio-Economic Conditions;
- Impact Assessment;
- Residual Impact Identification;
- Disclosure and Stakeholder Consultation; and
- Mitigation and Monitoring;

The purpose of stakeholder consultation is to obtain the views and opinions of potentially affected people and other interested parties. Stakeholder feedback was used to focus the impact assessment and, where appropriate, influence project design and execution.

Figure 3.1 The ESIA Process



3.2.1 Screening and Scoping

Screening is the first step in the assessment process. It confirms the need (or otherwise) for an ESIA by appraising the type of project and its associated activities throughout the project lifecycle in the context of its biophysical, socio-economic, policy and regulatory environments.

Given the location, scale and planned activities associated with the SD2 Project, it was agreed with the Ministry of Ecology and Natural Resources (MENR) that the project should be subject to an ESIA, and the ESIA should take account of applicable national and international legislation, SD Production Sharing Agreement (PSA) and BP standards as detailed in Chapter 2: Policy, Regulatory and Administrative Framework.

Scoping is a high level assessment of anticipated “interactions” between project activities and environmental “receptors”. Its purpose is to focus the assessment on key issues and eliminate certain activities from the full impact assessment process based on their limited potential to result in discernable impacts. To arrive at a conclusion to ‘scope out’ an activity/event, a mixture of expert scientific judgement based on prior experience of similar activities and events and, in some instances, scoping level quantification/numerical analysis (e.g. emission and discharge modelling) is used.

The SD2 Project Scoping process has included:

- Review of existing environmental and socio-economic data and reports relevant to the project activities; and
- Liaison with the SD2 Design Team to gather data and to formulate an understanding of project activities.

Based on the findings and results of these reviews, investigations and consultations, the following were identified:

- Potential project related environmental and socio-economic impacts based on likely interactions between SD2 Project activities and environmental/socio-economic receptors; and
- Gaps where the extent, depth and/or quality of environmental, socio-economic and/or technical data is insufficient for the SD2 Project ESIA process, thus identifying the additional work required to complete the ESIA.

3.2.2 Project Alternatives and Base Case Design

3.2.3.1 Project Alternatives

The initial step in defining a project is to identify, at a conceptual level, viable alternatives to the project so that a SD2 Base Case Design may be realised. Consideration of project alternatives occurs at two levels:

- To the development as a whole, including the “no development” option, and
- Engineering alternatives within the selected project’s concept design definition.

Project alternatives were defined during the early conceptual design of the SD2 Project and were compared on financial, technical design, safety, environmental and socio-economic criteria. The alternative that represented the best balance with regard to criteria was taken forward to the subsequent detailed design stage.

Chapter 4: Options Assessed presents a summary of the alternative designs considered and options evaluated for the SD2 Project.

3.2.3.2 Project Design

The SD2 ESIA Team worked with the SD2 Design Team to gather and interpret relevant information for the ESIA. This dialogue between the teams identified where additional project design definition, in terms of existing controls and additional mitigation measures, was required in the SD2 Base Case Design to minimise impacts. Opportunities identified for environmental and socio-economic enhancements were considered by the teams and incorporated into the SD2 Base Case Design where appropriate and practicable.

The SD2 Base Case Design, on which the SD2 Project ESIA is based, is presented in Chapter 5: Project Description.

3.2.3 Existing Conditions

In order to identify potential impacts to receptors, an understanding of the existing conditions was established prior to execution of project activities. The SD2 Project ESIA Scoping exercise determined that the project will likely result in impacts on the following receptor groups:

- Biological/Ecological;
- Physical Receptor/Feature;
- Soil, Ground Water and Surface Water Quality; and
- Socio-Economic/Human.

A number of environmental and socio-economic surveys have been undertaken within the SD Contract Area, along the proposed SD2 pipeline corridor, within Sangachal Bay and in vicinity of the Sangachal Terminal to support the preparation of the previous Azeri-Chirag-Guneshli (ACG) and SD ESIAs. Monitoring has also been undertaken from 2004 as part of the Environmental Monitoring Programme (EMP).

Onshore environmental surveys completed in the vicinity of the Terminal include noise, odour, visual context and light surveys, dust, a contamination survey, wetland characterisation survey, geotechnical, hydrological and cultural heritage baseline surveys. Meteorological and hydrological data was provided by the Baku State University National Hydrometeorological Department, and the Institute of Geography at the National Academy of Sciences of the Azerbaijan Republic, respectively.

The following reviews were completed in liaison with Azerbaijani academics from the Azerbaijan National Academy of Sciences to provide additional data:

- A literature review of migratory/overwintering birds for the Absheron-Pirallahi coastline;
- A review of fishing activities within the Azerbaijan sector of the Caspian Sea; and
- A review of published studies on the activity and distribution of Caspian Seal within the Caspian Sea.

Data on national and regional socio-economic conditions was obtained from a review of secondary data provided by the State Statistical Committee and Garadagh District Executive Power. Data on local socio-economic conditions was taken from a Stakeholder and Socio-Economic Survey (SSES) completed in 2011 within communities located in the vicinity of the Terminal (Sangachal Town, Azim Kend, Masiv 3 and Umid).

The results of the environmental and socio-economic surveys were used to prepare Chapter 6: Environmental Description and Chapter 7: Socio-Economic Description presented in this ESIA.

3.2.4 Impact Significance Assessment

An impact, as defined by the international standard ISO14001:2004 is:

“Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation’s environmental aspects”

Where “environmental aspect” is defined as:

“Element of an organisation’s activities or products or services that can interact with the environment”.

An impact is defined where an interaction occurs between a project activity and an environmental receptor. The ESIA process ranks impacts according to their “significance” determined by considering project activity “event magnitude” and “receptor sensitivity”. Determining event magnitude requires the identification and quantification (as far as practical) of the sources of potential environmental and socio-economic effects from routine and non-routine project activities. Determining receptor environmental sensitivity requires an understanding of the biophysical environment.

The sections below set out the methodology for both environmental and socio-economic impact assessment.

3.2.5 Environmental Impacts

3.2.5.1 Method for Determining Event Magnitude

Event magnitude is determined based on the following parameters, which are equally weighted and are each assigned a rating of “1”, “2”, or “3”:

- **Extent / Scale:** Events range from those affecting an area:
 - 1 – Up to 500m from the source or an area less than 50 hectares; to
 - 2 – Greater than 500m and up to 1km from the source or an area between 50-100 hectares; to
 - 3 – Greater than 1km from the source or an area greater than 100 hectares.
- **Frequency:** Events range from those occurring:
 - 1 - Once; to
 - 2 - Up to 50 times; to
 - 3 - More than 50 times or continuously.
- **Duration:** Events range from those occurring for:
 - 1 – Up to one week; to
 - 2 - More than one week and up to one month; to
 - 3 - Periods longer than one month to permanent.
- **Intensity:** Concentration of an emission or discharge with respect to standards of acceptability that include applicable legislation and international guidance, its toxicity or potential for bioaccumulation, and its likely persistence in the environment. Degree/permanence of disturbance or physical impact (e.g. disturbance to species, loss of habitat or damage to cultural heritage). Ranges from:
 - 1 - A low intensity event; to
 - 2 - A moderate intensity event; to
 - 3 - A high intensity event.

Overall event magnitude is scored from low (1) to high (12) by adding the individual parameter scores:



Resulting individual ratings are summed to give the overall event magnitude ranking. Table 3.1 presents the score ranges for magnitude rankings of "Low", "Medium" and "High".

Table 3.1 Event Magnitude Rankings

Event Magnitude	Score (Summed Parameter Rankings)
Low	4
Medium	5-8
High	9-12

3.2.5.2 Method for Determining Receptor Sensitivity

Receptor sensitivity is determined based on the following parameters, which are equally weighted and are each assigned a rating of "1", "2", or "3":

- **Biological/Ecological Receptors:**
 - **Presence:** Ranges from:
 - 3 - Routine, regular or reliably predictable presence of any species which is, in reverse order, a unique, threatened or protected species; to
 - 2 - Regionally rare or largely confined to the SD2 Project area or sensitive to industry emissions /disturbances; to
 - 1 - A species which is none of the above and is therefore assessed at the community level only.
 - **Resilience (to the identified stressor):** Ranges from:
 - 1 - Species or community unaffected or marginally affected; to
 - 2 - Species undergoing moderate but sustainable change which stabilises under constant presence of impact source, with ecological functionality maintained; to
 - 3 - Substantial loss of ecological functionality (e.g. loss of species in key groups, substantially lower abundance and diversity).
- **Human Receptor:**
 - **Presence:** Ranges from:
 - 3 - People being permanently present (e.g. residential property) in the geographical area of anticipated impact; to
 - 2 - People being present some of the time (e.g. commercial property); to
 - 1 - People being uncommon in the geographical area of anticipated impact.
 - **Resilience (to the identified stressor):** Ranges from:
 - 1 - People being least vulnerable to change or disturbance (i.e. ambient conditions (air quality, noise) are well below applicable legislation and international guidance); to
 - 2 - People being vulnerable to change or disturbance (i.e. ambient conditions (air quality, noise) are below adopted standards); to
 - 3 - Most vulnerable groups (i.e. ambient conditions (air quality, noise) are at or above adopted standards).

- **Physical Receptor/Feature:**
 - **Presence (to the identified stressor):** Ranges from:
 - 3 - Presence of feature any species which has, in reverse order, national or international value (e.g. state protected monument); to
 - 2 – Feature with local or regional value and is sensitive to disturbance; to
 - 1 - Feature which is none of the above.
 - **Resilience (to the identified stressor):** Ranges from:
 - 1 – Feature/receptor is unaffected or marginally affected i.e. resilient to change;
 - 2 – Undergoes moderate but sustainable change which stabilises under constant presence of impact source, with physical integrity maintained; and
 - 3 – Highly vulnerable i.e. potential for substantial damage or loss of physical integrity.
- **Soil, Ground Water and Surface Water**
 - **Presence:** Ranges from:
 - 3 – Receptor is highly valued e.g. used extensively for agriculture, used as a public water supply; to
 - 2 – Receptor has moderate value e.g. moderate/occasional use for agriculture purposes; to
 - 1 – Receptor has limited or no value.
 - **Resilience (to the identified stressor):** Ranges from:
 - 1 – No or low levels of existing contamination (well below accepted standards) and receptor is unaffected or marginally affected i.e. resilient to change; to
 - 2 – Moderate levels of mobile contamination present which are vulnerable to physical disturbance; to
 - 3 – High levels of mobile contamination present which are highly sensitive to physical disturbance.

Overall receptor sensitivity is then scored on a spectrum from low (1) to high (6) by adding the individual parameter scores:



Table 3.2 presents the score ranges for sensitivity rankings of "Low", "Medium" and "High".

Table 3.2 Receptor Sensitivity Rankings

Receptor Sensitivity	Score (Summed Parameter Rankings)
Low	2
Medium	3-4
High	5-6

3.2.5.3 Method for Determining Environmental Impact Significance

Impact significance, as a function of event magnitude and receptor sensitivity is subsequently ranked as "Negligible", "Minor", "Moderate" or "Major" as presented in Table 3.3 below. Impacts can be "positive" or "negative".

Table 3.3 Impact Significance

		Receptor Sensitivity		
		Low	Medium	High
Event Magnitude	Low	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	High	Moderate	Major	Major

Any impact classified as “Major” is considered to be significant and where the impact is negative, requires additional mitigation. Impacts of negligible, minor or moderate significance are considered as being mitigated as far as practicable and necessary, and therefore, do not require further mitigation.

3.2.6 Socio-Economic Impacts

The socio-economic impact assessment will use a semi-qualitative assessment approach to describe and evaluate impacts. Factors taken into account to establish impact significance will include probability, spatial extent, duration and magnitude of the impacts in addition to the sensitivity of receptors (e.g. the groups of people or populations most likely to be affected and, in particular, whether impacts are likely to be disproportionately experienced by vulnerable groups).

Indirect socio-economic impacts (i.e. induced effects) will also be assessed using the same approach.

3.3 Transboundary and Cumulative Impacts

Transboundary impacts are impacts that occur outside the jurisdictional borders of a project’s host country. Potential SD2 Project transboundary impacts are considered to include:

- Socio-economic issues surrounding the sourcing of labour, goods and services from the international market; and
- Greenhouse gas (GHG) emissions to air.

Cumulative impacts arise from:

- Interactions between separate project-related residual impacts; and
- Interactions between project-related residual impacts in combination with impacts from other projects and their associated activities.

These can be either additive or synergistic effects, which result in a larger (in terms of extent or duration) or different (dependent on impact interaction) impacts when compared to project-related residual impacts alone.

The cumulative assessment presented in Chapter 13: Cumulative and Transboundary Impacts and Accidental Events, initially considers the potential for impact interaction and accumulation in terms of the following:

- **Temporal Overlap** – the impacts are so close in time that the effect of one is not dissipated before the next one occurs; and
- **Spatial Overlap** – the impacts are so close in space that their effects overlap.

At the time of writing the following new projects are proposed or are under construction in the vicinity of the Sangachal Terminal:

- Qizildas Cement Plant – new 5,000 tonne capacity cement plant located approximately 4km north of the Terminal;
- SD1 Flare Project – replacement of an existing ground flare and surrounding enclosure located within the existing Terminal boundary, with a new elevated flare package;
- Garadagh District Umbaki (Jeyildagh) Jailhouse – this development comprises a prison which holds up to 1,500 people;
- New Baku Port – the location of the new port is close to Alyat settlement, 25km to the south of the Terminal. The port covers an area of 400 hectares and includes the construction of two bridges for ferry boat movements, three freight bridges for container vessels, provision of infrastructure for the movement of roll-on and roll-off cargo, and a large dry cargo storage area;
- Baku Shipyard Company – this development is located 23km from the Terminal adjacent to an existing deep water plant and comprises a modern shipyard facility;
- SOCAR Petrochemical Complex – to be located within the Garadagh district and comprising a gas processing plant, oil refinery and petrochemical plant; and
- Navy and Military camp for Navy Officers – located close to Sahil settlement, this development aims to provide residential housing for officers' families.

In addition it is understood that, a result of an expected significant increase in traffic flows due to industrial development to the north (towards Sahil) and to the south (at Alyat), it is planned to expand the Baku-Salyan Highway along its length to 4 lanes in each direction.

Where there is potential for impact interaction, the project is sufficiently defined and sufficient data is available, a quantitative assessment is undertaken. Where insufficient data is available a qualitative assessment is presented (refer to Chapter 13).

3.4 Mitigation and Monitoring

The iterative and integrated nature of the ESIA and project planning processes means that the majority of proposed additional mitigation measures and strategies have been incorporated into the project Base Case (as provided within Chapter 5: Project Description) and integrated into the design. Those additional mitigation and monitoring initiatives detailed in this document will be incorporated into the management plans that will be used during the construction and operational phases.