Chapter 3 Approach and Methodology

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3 APPROACH AND METHODOLOGY

3.1 Introduction

This chapter describes the process undertaken to produce this Environmental and Social Impact Assessment (ESIA) and presents the methodology used to assess the significance of impacts that may result from the South Caucasus Pipeline Expansion (SCPX) Project. Potential impacts have been identified through baseline assessment carried out in specific relation to the works activities anticipated in this Project and experience gained during Western Route Export Pipeline (WREP), Baku–Tbilisi–Ceyhan (BTC) pipeline and South Caucasus pipeline (SCP) construction and operation in Georgia. At the outset of this Project, it was decided that a more contemporary approach to the impact assessment process would be required than was originally defined in the SCP EIA (2002). Impact assessment methodology has evolved significantly since 2002 and the methodology used to assess the impacts from the SCPX Project will adopt widely established current industry standards and practice.

The methodology takes account of potential impacts on a wide range of receptors including:

- The physical and chemical environment (e.g. climate, air quality, soil and groundwater quality)
- The biological environment (e.g. plants, terrestrial animals, birds and their food chains)
- Communities, social groups and individuals (e.g. employment generation, changes in per capita incomes, threats to vulnerable groups and exposure to health and safety risks).

The results of the impact assessment, assignment of mitigation measures and discussion of key impacts are presented in Chapter 10 (Environmental and Social Impacts and Mitigations (Planned Events)), Chapter 11 (Cumulative and Transboundary Impacts), Chapter 12 (Hazard Analysis and Risk Assessment (Unplanned Events)) and Appendix B (Impact assessment and mitigation tables).

3.2 ESIA Process

The principles of ESIA are now widely established. Figure 3-1 illustrates several key steps in the general approach.

All major projects will cause some changes to the environment. In the past the ESIA process mainly identified what these changes would be and, after proposing mitigation, reported them to the decision maker. As ESIA has evolved, the emphasis has moved on to the reduction of potential adverse impacts and maximising potential benefits through appropriate design measures. Designing out the significant effects of a project is the central tenet of the approach.

As can be seen from Figure 3-1 an iterative assessment process is shown in the central box of the diagram. The aim of the process is to design out or minimise potential impacts and to do so in a way that prioritises those that are potentially most significant.

The assessment process constitutes a systematic approach to the evaluation of the proposed project in the context of the natural, regulatory and socio-economic environments in which development is proposed. Each of the steps in the ESIA process will be described in turn in the following sections. However, key to understanding the process applied to minimising the impact of this project has been the iterative development of mitigation measures. All of the potential impacts arising from this Project have been identified, and

either standard, recognised industry-practice mitigation measures or impact-specific, feasible and cost-effective mitigation measures have been applied. Any potential impacts that remain after the application of mitigation measures are referred to as residual impacts.

All residual environmental and social impacts are assigned a level of impact of low, medium, high or beneficial, following the methodology described in Section 3.9.3.

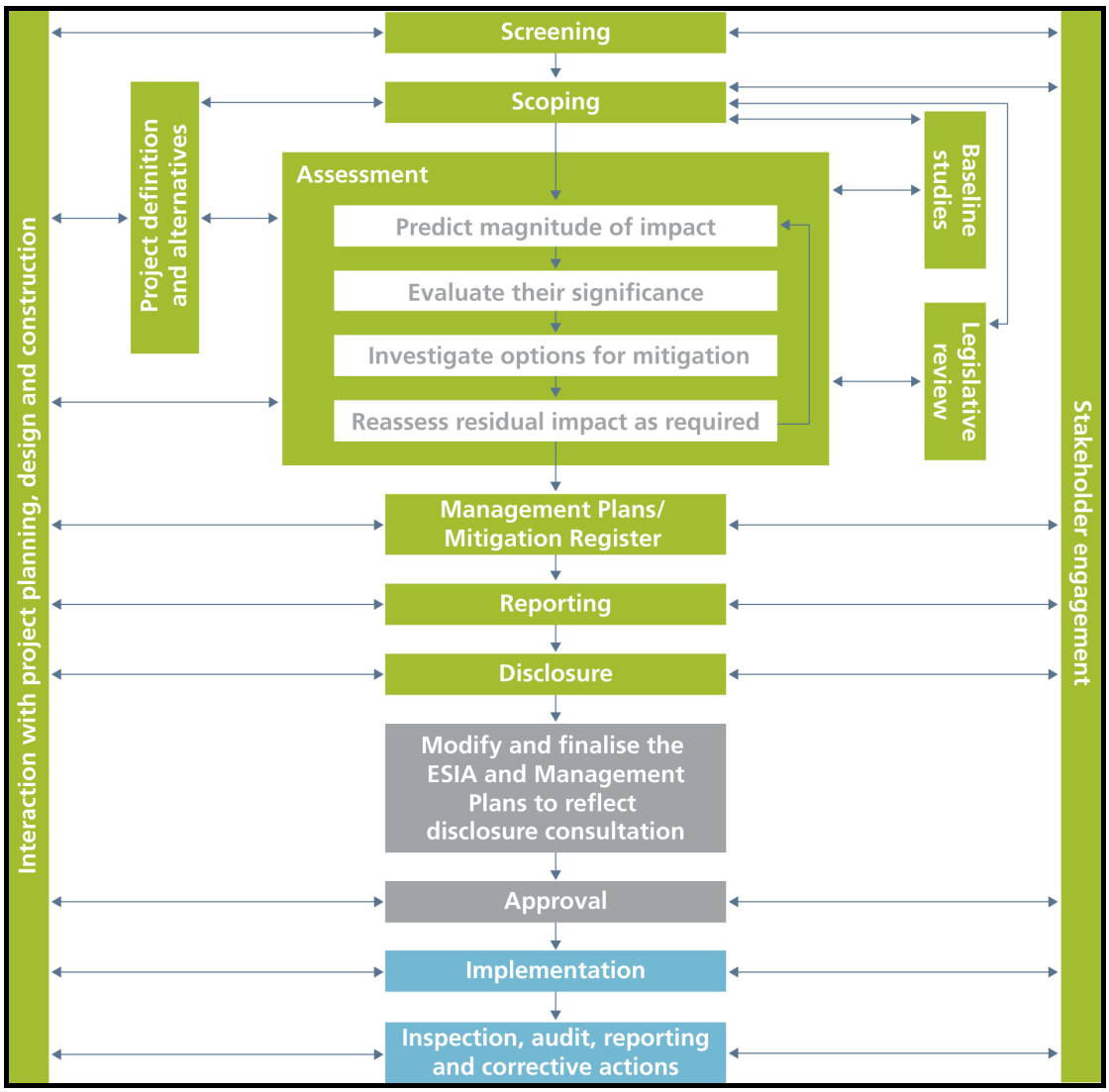

Figure 3-1: The ESIA Process

This ESIA addresses the environmental and social issues associated with the proposed SCPX Project and supplements earlier environmental studies undertaken by BP. It does not seek to repeat information contained in other reports that have been submitted previously to the Georgian Ministry of Environment Protection (MoE). The SCPX ESIA process has referred to the SCP ESIA (2002) and BTC ESIA (2002) but has followed the standard key steps to produce an ESIA for a new development project, as illustrated in Figure 3-1 and described in the following sections.

3.3 Stakeholder Consultation and Disclosure

3.3.1 Overview

The process of stakeholder consultation and disclosure is an ongoing, overarching requirement that applies to the entire ESIA process. The SCP HGA includes specific

requirements for the disclosure (including the time period) of the ESIA. Disclosure is also a requirement of Georgian EIA legislation (set out in the Law of Georgia on Environmental Impact Permits (EIP) 2007 (as amended) and the Environmental Impact Regulations 2009) and is considered good international gas pipeline industry practice. Consultation is of critical importance in gaining insights into the key environmental and social issues, addressing the concerns of communities and other stakeholders, and aiding the development of potential strategies for tackling Project impacts. BP recognises the importance of stakeholder consultation, participation and disclosure during the lifetime of the Project.

Effective consultation with stakeholders is:

- Key to understanding the concerns of affected communities and other stakeholders
- Achieved by effective disclosure, through the release of timely, accurate and comprehensive information to stakeholders. This is essential to ensure that the likely impacts (both positive and negative) are understood by stakeholders, and that they can provide feedback to the Project.

Stakeholder consultation has the following objectives:

- **Inform**: Provide accurate, relevant, timely and culturally appropriate information to Project stakeholders about the SCPX Project, its impacts and benefits, and the ESIA process. The Project's stakeholders include host governments, regulatory authorities and Project-affected communities (and are listed in Chapter 9 (Consultation Process) and Appendix C1 (Public Consultation and Disclosure Plan)
- **Engage**: Provide opportunities for Project stakeholders to express their opinions and concerns about the Project, and to seek broad stakeholder support for the Project and impact management
- **Understand**: Enable the SCPX Project team to understand the concerns and priorities of stakeholders
- **Review**: Incorporate justified concerns and priorities into the design, construction and operation of the SCPX Project
- **Inform (feedback)**: Provide feedback to Project stakeholders and host communities as the Project develops so that the consultation process continues.

This cyclical process is illustrated in Figure 3-2.

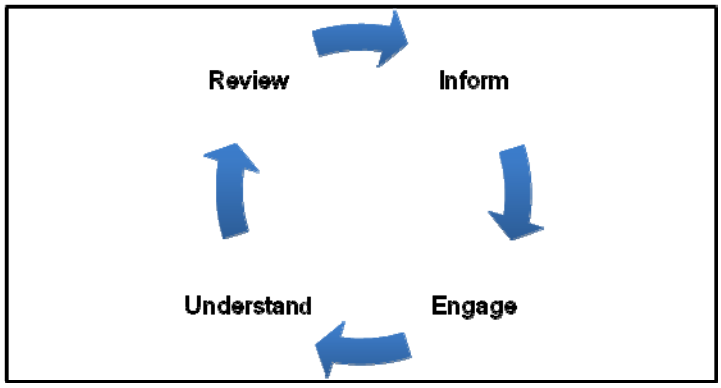

Figure 3-2: Benefits of Effective Consultation and Disclosure

Methodologies for consultation and disclosure are discussed in more detail in the following sections of this ESIA:

- Chapter 8 (Socio-Economic Baseline), which outlines social and economic issues raised by stakeholders during the consultation process

- Chapter 9 (Consultation Process), which details the results of consultation undertaken during the scoping/early ESIA stage of the SCPX Project
- Appendix C1, the Public Consultation and Disclosure Plan (PCDP), which includes further information on the methodology used for data collection, consultation and lists of stakeholders consulted at each point.

The consultation and disclosure process is important and complex and care has been taken to capture and document stakeholder concerns. Care has also been taken to coordinate with the considerable amount of work that has already been initiated by BP with the stakeholder groups in Georgia. Specific meetings were held with governmental stakeholders at an early stage in the Project and with non-governmental organisations (NGOs) and the scientific community. In addition to this, specific community consultations were undertaken within Project-Affected Communities (PACs). PACs have been defined for this Project as communities within 2km of the pipeline section (including block valves and pigging stations) and storage yards, 5km from construction camps and facilities (i.e. CSG1, CSG2 and the PRMS) and within 300m of access roads.

3.3.2 Stakeholder Identification

BP and the ESIA consultants worked together to identify the key stakeholders to be consulted as part of the SCPX Project. This was done using a combination of previous experience during construction and ongoing operation of SCP, knowledge of Georgia and the local communities around SCP, and consultation with authorities, academics, etc. This has sought to ensure that all the people who may be affected by or have an interest in the proposed Project have had an opportunity to obtain information about the Project and to express their opinions and concerns.

Stakeholders were drawn from the following groups:

- Authorities comprising national, regional and local government bodies of primary political importance to the Project and to the ESIA process
- National and regional NGOs, and international NGOs with a presence in Tbilisi
- Scientific community
- Residents, community leaders (trustees), vulnerable groups and land users in the towns and villages in the PACs, i.e. those within 2km of the proposed pipeline and storage areas, 5km of construction camps and facilities and 300m of access roads.

A full list of the stakeholders consulted can be found in Chapter 9 (Consultation Process) and the PCDP (Appendix C1).

3.3.3 Tracking Consultation

Documentation of public consultation is important to ensure that inputs are captured and fed into the Project planning process and to maintain a record of issues raised by consultees. Minutes were taken for all meetings that include the date of the meeting, material issues raised, people involved and agreed actions. The results of consultation activities are recorded in a stakeholder database. Agreed actions related to mitigation of identified potential impacts will be considered and as appropriate transferred into the Project commitments register (discussed in Chapter 13 Management and Monitoring). An outline of the results of consultations carried out to date is presented in Chapter 9 (Consultation Process).

3.4 Screening Phase

Screening is undertaken at the very early stages of project concept development to identify potentially significant impacts. Early identification of these potential impacts enables projects to gain an early understanding of the key environmental and social sensitivities and the potential project impacts on those sensitivities. It results in a list of prioritised potential

impacts that are likely to require management throughout the life of the project and through to operations. The output from screening informs the scoping of the impact assessment (Section 3.5).

The early nature of screening usually means that precise quantitative data may be unavailable or imperfect. However, as the SCPX Project is located in an area where significant environmental and social baseline data is already available (from previous SCP and BTC ESIAs, operational data and environmental and social monitoring), the screening output was considered fairly robust and representative.

Screening was undertaken for the SCPX Project in line with the requirements of BP's Environmental and Social Group Defined Practice (E&S GDP). The screening workshop was carried out by environmental and social specialists combining representatives from the Project and the Georgian and Azerbaijan operations environmental and social team. The screening study assessed 25 key environmental and social indicators against Project activities (construction and operation), ranking each potential impact from low to high.

The output from the screening process indicated the following potential impacts as some of the key areas for the ESIA scoping to focus on in the construction and operation phases:

- Construction phase: Employment and economic opportunity, cultural heritage, community safety and disturbance, infrastructure quality, community health, economic resettlement, protected areas and protected or endangered species
- Operations phase: Greenhouse gases, protected areas, protected or endangered species, and community safety and disturbance

3.5 Scoping Phase

An important initial stage in the ESIA process is the scoping of key issues. An ESIA is a multidisciplinary study and its success in connection with any given project depends largely on the ability to identify at an early stage the key environmental and socio-economic issues that should be focused upon. Scoping is the process of determining which issues are likely to be important, including the identification of key environmental and social issues and defining the ESIA terms of reference (ToR). Scoping has identified some or all of the matters to be addressed in the ESIA, including, but not limited to:

- Identifying the impacts to be assessed, especially focusing on those that are critical to decision-making by the Project proponents, stakeholders and regulatory authorities
- Assessing the types of alternatives to be examined including routing, design solutions and mitigation
- Baseline aspects that require particular attention.

Since the SCPX Project is an expansion of an existing operational pipeline, where baseline environmental and social conditions are largely understood, part of the scoping exercise was to consider whether any significant gaps were present in the existing baseline data, and to focus on filling the gaps with primary baseline data where necessary.

An integral and essential component of the scoping process is stakeholder consultation, which has been carried out in specific connection with the Project (summarised in Chapter 9 and the PCDP, Appendix C1). Consultation has been undertaken throughout the ESIA process, and was not a discrete phase of the ESIA. BP has an ongoing stakeholder engagement programme in Georgia in connection with existing SCP, BTC and WREP operations, and stakeholder consultation for SCPX was carried out both as an extension of this programme and as specific community consultation within the PACs. Consultation with key governmental stakeholders was initiated early in the ESIA process, with NGO, scientific

community and consultation with the PACs following later. Information and feedback provided by stakeholders was used to inform the scope of the ESIA.

Consultations between various Project teams were also carried out to maximise the use of information and knowledge gained from previous projects undertaken in Georgia.

Meetings were held with stakeholders on an ongoing basis through the ESIA process to inform the ESIA and identify key issues. These will continue throughout the design, construction and operation of the SCPX Project as described in Chapter 9.

Although the description of the scoping process provided above has been described, by necessity, as a discrete step in the ESIA process, scoping in application is actually an ongoing and iterative activity. The use of scoping as a dynamic and evolving tool has enabled the ESIA process to respond to new information, changed emphasis or project modification arising from the baseline data collection, consultation and design processes.

3.6 Project Development and Evaluation of Alternatives

Prior to agreeing the SCPX Pipeline route, the compressor station locations and other aspects of Project design, viable alternatives were identified so that a realistic base-case design could be developed. However, design development is an iterative process and the design is modified continuously to take account of new information as and when it becomes available, including information from the ESIA process.

As new information becomes available the status of potential impacts is continually reviewed and updated. This iterative stage assists in reducing the overall potential impacts of the Project. To facilitate this, the ESIA team worked closely with the design engineers and with ESIA personnel based in engineering offices.

A full discussion of the alternative options that were assessed during the Project development is provided in Chapter 4, including the social and environmental implications of a ‘no development option’.

3.7 Legislative Review

The legal, policy and administrative framework review for this Project is described in Chapter 6. This review addresses social and environmental requirements and policies relevant to the SCPX Project at the following levels:

- SCP host government agreement (HGA) including
    - good international gas pipeline industry standards and practices
    - World Bank Standards
    - UK standards and practices
- Other national legislation and policies
- International conventions that Georgia has ratified, acceded to or is a signatory (see Section 6.3)
- BP policy and management systems.

Understanding the legal and policy framework ensures that the SCPX Project has been assessed, as far as possible, against relevant existing environmental and social regulations and guidelines as well as BP’s environmental, social, ethical and business policies and standards.

3.8 Establishing Baseline Information

The scoping exercise for the SCPX Project involved a review of available environmental and socio-economic data sources to identify gaps in baseline information necessary to complete the ESIA process. The original SCP and BTC Project ESIAs (2002), and existing SCP and BTC operations' monitoring results to date, all of which contain valuable baseline information, were reviewed. This gap-analysis approach allowed the Project to avoid repetition of work already undertaken and maximise the collection of focused, up-to-date baseline data from the Project area.

The results of the scoping study indicated that there were certain key issues requiring detailed additional study for the SCPX Project, and that certain existing baseline data for the Project were either insufficient or out of date (the original SCP ESIA baseline data was collected in 2001) and required supplementary information. The detailed baseline surveys therefore conducted for the SCPX ESIA were:

- Botanical survey of pipeline route, facilities, construction camp locations and CSG2 access road
- Zoological survey of pipeline route, facilities, construction camp locations and CSG2 access road
- Macro-invertebrate surveys of the two main rivers that the pipeline crosses (Mtkvari and Algeti) and the smaller Aji River
- Fish surveys of the Algeti and the Aji Rivers
- Cultural heritage survey of pipeline route, facilities, construction camp locations and CSG2 access road
- Land contamination survey of pipeline route, facilities, construction camp locations and CSG2 access road
- Soil survey of pipeline route, block valve site and the pigging station
- Socio-economic survey including gathering of
    - national, regional and Project community-specific baseline information
    - baseline data for existing health issues and conditions within PACs
    - information regarding the use of land by households in the PACs
- Traffic surveys at key points along access roads
- Project-specific community consultation
- Geohazards including landslides, soil classification and erosion susceptibility
- Groundwater
- Surface water quality including sampling at significant watercourse crossings
- Background noise measurement near local receptors
- Background air monitoring near local receptors
- Landscape and visual survey
- Topographic survey.

Baseline SCP information (e.g. from biorestoration, groundwater and surface water, air, noise and meteorological surveys undertaken in 2007–2011) were supplemented with the SCPX fieldwork using a combination of local and international scientists.

Summaries of the environment and social baseline report for the physical environment, biological environment and cultural heritage are provided in Chapter 7 and for socio-economic conditions in Chapter 8. More detailed reports on certain baseline studies are contained within the Environment and Social Baseline (ESB) Report for this Project, namely geology, geomorphology and geohazards, soils and ground conditions, landscape and visual, surface water, ground water, ecology, climate and air quality, noise, cultural heritage, traffic and socio-economic and health conditions.

3.9 Impact Assessment Methodology

The impact of the SCPX Project on the physical, biological and socio-economic environment has been assessed using the methodology described in the following section. As noted in Section 3.1, it was decided that a more contemporary approach to the impact assessment process would be used than was originally defined in the SCP ESIA (2002).

To maximise the transparency of the ESIA, criteria for assessing the significance of impacts are defined for each issue and type of impact in this section. These criteria take into account whether the project is expected to:

- Cause project standards to be exceeded, e.g. air, water or soil quality, noise levels, or make a substantial contribution to the likelihood of exceedance
- Adversely affect protected areas or features, or valuable resources: nature conservation areas, rare or protected species, protected landscapes, historic features, livelihoods, important sources of water supply and other key ecosystem services (i.e. the benefits people gain from ecosystems)
- Conflict with established company policy/practice.

3.9.1 Identification of Impacts

The impact assessment process initially involves identification of the Projects' activities and potential environmental and social impacts resulting from each activity during the Project phases. A Project activity could include site preparation, construction, reinstatement, operation and decommissioning. It would also encompass planned routine activities; planned, but non-routine activities; and unplanned or accidental events.

Within this ESIA, an impact is defined as 'Any change to the physical, biological or social environment, whether adverse or beneficial, wholly or partially resulting from an organisation's activities, products or services'. An impact may result from any or all Project activities.

Project activities give rise to issues, which in turn could then cause an impact to an environmental or social receptor. Table 3-1 illustrates the links between activity, issue and potential sources of impact. All SCPX Project activities and associated issues have been identified. Generic Project issues and potential impacts and route- or site-specific issues and potential impacts are tabulated in Appendix B.

Table 3-1: Issues–Receptors–Impacts Example

Issue		Receptor	Potential Impacts
A1	Dust generation, particularly from vehicle movements and storage of excavated materials	People	Respiratory problems Nuisance e.g. dust on washing and windows
		Wildlife	Respiratory problems for animals (excluding bees)
		Livelihoods	Harm to bees Reduced photosynthesis and therefore productivity of crops

A variety of impacts can occur and are identified and addressed in this ESIA, as defined below:

- Negative – an impact that is considered to represent an adverse change from the baseline, or introduce a new undesirable factor
- Positive or beneficial – an impact that is considered to represent an improvement to the baseline or introduces a new desirable factor

- Direct (or primary) – impacts that result from a direct interaction between a planned Project activity and the receiving environment (e.g. between occupation of the pipeline corridor and pre-existing habitats)
- Secondary – impacts that follow on from the primary interactions between the Project and its environment as a result of subsequent interactions within the environment (e.g. loss of part of a habitat affects the viability of a species population over a wider area)
- Indirect – impacts that result from other activities that are encouraged to happen as a consequence of the Project (e.g. new business set up to cater for increased traffic on roads)
- Transboundary – impacts that extend or occur across a national boundary
- Cumulative – impacts that act together with other impacts, from the same or other Projects, to affect the same environmental or social resource or receptor
- Short-term – impacts that are predicted to last only for a limited period (e.g. during pipeline construction) but will cease on completion of the activity, or as a result of mitigation/reinstatement measures and natural recovery (e.g. temporary employment of unskilled workers during construction)
- Long-term – impacts that will continue over an extended period, (e.g. operational air emissions) but cease when the Project stops operating. These will include impacts that may be intermittent or repeated rather than continuous if they occur over an extended time period (e.g. repeated seasonal disturbance of species as a result of pipeline inspection using existing tracks)
- Permanent – impacts that occur during the development of the Project and cause a permanent change in the affected receptor or resource (e.g. the destruction of a cultural artefact or loss of mature forest) that endures substantially beyond the Project lifetime
- Accidental – impacts that result from accidental (unplanned) events within the Project (e.g. fuel spillage during re-fuelling) or in the external environment affecting the Project (e.g. landslide). In these cases the probability of the event occurring is considered.

3.9.2 Mitigation of Potential Impacts

Mitigation measures are the actions or systems that are used, or have been proposed, to avoid, eliminate, reduce or compensate for impacts that have been identified in screening and further analysed in the impact assessment. In some instances, mitigation will be inherent in design; in others, mitigation measures have been identified by the ESIA process for implementation during design optimisation, construction and operation of the Project. The ESIA process therefore involves identifying where significant impacts could occur and then identifying technically and financially feasible and cost-effective means of mitigating those impacts. These measures are then agreed with the Project team via a multidisciplinary mitigation workshop, and all agreed mitigation measures are integrated into the ESIA. The mitigation measures are tracked through to the Project Commitments Register as clear, unambiguous commitments. In this ESIA the Commitments Register is the authoritative source of all mitigation measures that the Project proposes to make.

Mitigation has been an integral part of the SCPX Project design process and will continue through to construction and operation. Where a significant impact has been identified, a hierarchy of options for mitigation has typically been explored as follows.

- Avoid at source – remove the source of the impact
- Abate at source – reduce the source of the impact
- Attenuate – reduce the impact between the source and the receptor
- Abate at the receptor – reduce the impact at the receptor
- Remedy – repair the damage after it has occurred
- Compensate/offset – replace in kind or with a different resource of equal value.

It should be noted that compensation or offset does not automatically make an impact 'acceptable' or excuse the need to consider other forms of mitigation as discussed in the hierarchy.

Examples of enhancing beneficial impacts or developing opportunities for positive benefits can include:

- Preference for hiring unskilled labour from local communities
- Preference for use of local suppliers.

It is important to note that the application of mitigation measures is an iterative process as shown in Figure 3-1, with residual impacts remaining only after all reasonable mitigation measures have been applied, often after several iterations. The process of iteration will continue until an impact is deemed as low as reasonably practicable.

Mitigation measures, already implemented or proposed for the SCPX Project, are discussed in Chapter 10 Environmental and Social Impacts and Mitigations (Planned Activities) and Chapter 12 Hazard Analysis and Risk Assessment and set out definitively in the Commitments Register, and include in summary:

- Routing of the new SCPX pipeline section as close as practicable to the existing BTC and SCP pipelines to overlap with the previous construction ROW
- Measures in the Project design (e.g. ensuring the pipeline is routed a safe distance from dwellings and communities)
- Location of compressor station sites adjacent to existing facilities where possible at CSG1 and the PRMS
- Engineering design solutions during the ESIA process (e.g. increasing pipe burial depth at vulnerable watercourse crossings, height of vent, acoustic cladding, seal gas recovery)
- Alternative solutions to processes and methods to achieving objectives (e.g. methods of transporting materials, or recruitment of unskilled workers)
- Construction and operational control procedures (e.g. contractor requirements to demarcate work areas to prevent work outside approved zones)
- Conservation management (e.g. pre-clearance surveys to remove sensitive fauna from the construction sites)
- Management systems (e.g. comprehensive systems of policies, procedures, and industry standards that have been developed and implemented to manage environmental, social, health and safety hazards and risks related to the Project)
- Development of policies and procedures to control impacts and apply mitigation measures (e.g. compensation plans for land/livelihoods)
- Timing restrictions (e.g. generally no night-time construction activities near villages).

3.9.3 Residual Impacts and Defining Significance

Any impacts remaining after mitigation measures have been applied to the extent that an impact is deemed as low as reasonably practicable are considered residual impacts. The significance level of the residual impact is assessed as a combination of:

- The importance/sensitivity of the receptor
- The magnitude of the impact.

To allow assessment of impact significance, tables have been specifically developed for this Project to define the importance/sensitivity of receptor and the magnitude of a potential impact. These tables are presented in the sections below. Several considerations have

been built into the tables including temporal, spatial, impact reversibility, direct and indirect impacts, internationally used emission or ambient environmental quality standards and relevant legal or policy constraints.

It should be noted that any legislation, guidelines and standards described within the significance tables have been used as references only for the purposes of assessment of impact significance and that the applicable legislative requirements for the Project are found within Chapter 6 (Policy, Legal and Administrative Framework). Additionally, the legislation and standards referenced are not necessarily in accordance with the environmental and social standards as specified in the HGA.

The significance level is ranked in four categories: high, medium and low adverse, and beneficial. These rankings are used for both environmental and social residual impacts. It should be noted that this is a relative assessment and the results of the significance of residual impacts ranging from low to high adverse are a comparative scale that seeks to identify the relative magnitude of the impacts in qualitative terms. The method used for evaluating the level of significance of impacts, before and after implementation of the proposed mitigation measures, is discussed in detail in the sections below.

It is often difficult to compare residual impacts consistently across different natural and socio-economic environments. Scientific evidence and predictions based on observation of similar activities have been used in the impact assessment process. Where this is not possible, qualitative judgment has been used to ascribe impact based on the Project and ESIA team's extensive experience and knowledge.

3.9.4 Importance/Sensitivity of the Receptor

The importance/sensitivity of a receptor has been defined for the Project taking into account such matters as its local, regional, national or international designation, its importance to the local or wider community, its ecosystem function or its economic value. The assessment of the sensitivity of human receptors, for example a household, community or wider social group, has taken into account their likely response to the change and their ability to adapt to and manage the effects of the impact.

The importance/sensitivity of the receptor has been determined on a topic-by-topic basis on an A–E tiered scale, as shown in the topic-based tables in Section 3.9.6 (A = very low; B = low; C = medium; D = high; E = very high).

3.9.5 Magnitude of Potential Impact

The term 'magnitude' is used to encompass all the dimensions of the predicted impact including:

- The nature of the change (what is affected and how)
- Its size, scale or intensity
- Its geographical extent and distribution
- Its duration, frequency and reversibility.

Project-specific magnitude tables have been developed for each topic listed in Section 3.9.6. The magnitude of the impact has been determined on a 1–5 tiered scale (1 = very small; 2 = small; 3 = medium; 4 = large; 5 = very large). The tables are provided in Section 3.9.6.

To encompass different issues, a number of criteria are defined for each level of impact. Where an impact meets criteria in more than one level of impact, it is categorised according to the highest level, so if an impact meets criteria in both the medium and large categories it is classed as large. The range of criteria in each level encompasses a number of parameters (e.g. habitats and species are addressed in the ecology table); an impact therefore only has to meet one of the criteria in each category to be assigned that score.

In developing criteria for spills or other accidental events (e.g. gas releases), a distinction has been drawn between immediate area, localised and widespread damage. There are no fixed rules for determining the boundaries of these zones, but the immediate area is the area immediately covered by the spill and is meant to imply confinement of the spill to this area. Localised means that the spill has spread out to the area around the spill but is confined to the working area (i.e. the area within BP's control). Widespread implies that the spill has spread out beyond the working area, usually because it has been carried downstream by a watercourse or entered groundwater.

In evaluating cultural heritage and socio-economic impact magnitude criteria, an additional tier of 'beneficial' has been added to the tables to allow for the beneficial effects the Project. may have on these topic areas.

3.9.6 Impact Significance Assessment Tables

This section presents the topic-based tables that have been used in this ESIA to assess impact significance. Each topic has two associated tables, one indicating importance/sensitivity of receptors and the other indicating magnitude of impact. The tables are accompanied by text explaining the approach adopted to assess the impacts and identify the criteria used for each topic. Receptor importance/sensitivity and magnitude tables have been developed for the following topics:

Importance/sensitivity	Magnitude
Soils and ground conditions	Soils and ground conditions
Landscape and visual impact	Landscape and visual impact
Surface water	Surface water
Groundwater	Groundwater
Ecology	Ecology
Air quality	Air quality
Noise	Noise
Vibration	Vibration
Cultural heritage	Cultural heritage
Social	Land acquisition Economy, employment, skills and livelihoods Infrastructure and services
Traffic and transport	Traffic and transport

In addition, the Project has carried out a parallel health impact assessment (HIA), which has been executed in close cooperation with the ESIA. Table 3-25 presents a summary of the HIA methodology, which is based on the identification of the health impact and the probability (likelihood) of the impact occurring to determine the overall health risk.

Soil and ground conditions

The tables below consider the potential impact of the Project on soil productivity, erosion and ground stability. The tables also include criteria for the assessment of impacts of spills or other accidental events on ground conditions.

Table 3-2: Importance/Sensitivity of Receptors to Impacts on Soils and Ground Conditions

Receptor Importance/ Sensitivity	Ranking	Examples
Very low	A	Unused land
Low	B	Land used for grazing by roaming graziers
Medium	C	Agricultural land used for cereals Land used for permanent grazing or a rotational grazing system

Receptor Importance/ Sensitivity	Ranking	Examples
High	D	Land used for horticulture, fruit or other high value crops Sites valued or designated for protection on the grounds of geology or ecology at national level Soils with formation rates substantially lower than the moderate soil loss tolerance rate of 5–10te ha 1yr-1 as these are vulnerable to erosion, even when reinstated
Very high	E	Houses or communities close enough to be impacted by Project related erosion or ground movement Sites of international importance/designated for protection at international level on geological or ecological grounds

Table 3-3: Ranking of Magnitude of Predicted Impacts on Soils and Ground Conditions

Magnitude	Ranking	Examples
Very small	1	No detectable effect on soils or ground conditions Spill or accidental event that causes immediate area damage only and can be restored to an equivalent capability in a period of days or up to a month, i.e. full restoration is achieved as a result of immediate clean-up operations
Small	2	Minor losses of productivity expected to last up to six months after reinstatement Water remains in surface depressions for less than three months after construction Soil creep Spill or accidental event leading to immediate area or localised damage that may take up to six months to restore to pre-existing capability/function
Medium	3	Minor losses of productivity expected to last between 6 and 12 months after reinstatement Water predicted to remain in surface depressions less than one year after construction but more than three months Soil erosion evident but not leading to visible rill or gully formation Spill or accidental event leading to immediate area or localised damage that may take between six months to one year to restore to pre-existing capability/function Spill or accidental event leading to widespread damage that may take up to six months to restore to pre-existing capability/function
Large	4	Moderate losses of productivity expected to last between one and five years after reinstatement Water predicted to remain in surface depressions for between one and five years after construction Soil erosion predicted to lead to visible rill or gully formation Landslip or ground subsidence not leading to exposure of the pipe, or extending outside the working area Spill or accidental event leading to localised damage that cannot be

Magnitude	Ranking	Examples
		restored to pre-existing capability/function within one year Spill or accidental event leading to widespread damage that may take six months to one year to restore to pre-existing capability/ function
Very large	5	Moderate or major losses of productivity predicted to last more than five years after reinstatement Water predicted to remain in surface depressions permanently Rill and gully formation predicted to be extensive with potential impacts on neighbouring land and pipe integrity Landslip, ground subsidence or ground collapse that exposes the pipe and/or extends outside the working area Spill or accidental event leading to widespread damage that cannot be restored to pre-existing capability/function within one year

Landscape and visual impact

Assessing the significance of landscape and visual impact is a qualitative process, which relies upon subjectivity and reasoned judgement that is supported, as far as possible, by evidence. Significance is not absolute and can only be defined in relation to each development and its location. Therefore, the criteria and the significance thresholds used are reviewed for each assessment, to ensure they are relevant. The criteria tables below provide a guide only as to the likely level of significance of impacts, and the actual conclusions of the assessment may vary. The full assessment provides an explanation, using well informed and reasoned professional judgement, as to how the conclusions about significance for each effect assessed have been derived.

The approach below is in accordance with UK practice as laid down in the Landscape Institute and Institute of Environmental Management and Assessment's (IEMA) (2002) *Guidelines for Landscape & Visual Impact Assessment*, and is considered relevant to this Project.

Table 3-4: Importance/Sensitivity of Visual Receptors and Landscapes

Receptor Importance/ Sensitivity	Ranking	Examples
Very low	A	<u>Landscape receptors</u> Landscape that is dominated by derelict, disused or degraded man-made made structures and/ or which is not valued by local communities or others A natural landscape severely degraded or modified by cultural land uses, such as intensive arable or pastoral agriculture <u>Visual receptors</u> Receptors with no or very limited views

Receptor Importance/ Sensitivity	Ranking	Examples
Low	B	Landscape receptors A landscape with few intact or distinctive natural or historic features but which is valued at settlement/district/municipal level (e.g. attracts local visitors) Landscape with large, dominant, numerous and/or noisy modern man-made features A natural landscape degraded or modified by cultural land uses such as arable or pastoral agriculture Visual receptors People at their place of work, industrial facilities
Medium	C	Landscape receptors Landscape with a number of distinctive natural landforms or historic/traditional features that add character and where modern man-made features may be present but do not significantly degrade the landscape character Anthropogenic landscape which has a more traditional, less intensive character and which has a higher sensitivity to change due to the presence of features such as gardens, orchards and traditional or unimproved pastures. A settlement which is valued at provincial /regional level (e.g. attracts tourists from province/region) Visual receptors People travelling through or past the affected landscape in cars, on trains or other transport routes where higher speeds are involved and views sporadic and short-lived People engaged in outdoor recreation where enjoyment of the landscape is incidental rather than the main interest
High	D	Landscape receptors Landscape valued or designated for its landscape importance at national level (e.g. attracts tourists within the country) Landscape with a high degree of naturalness or dominated by traditional/historic landscape features and an absence of modern man-made features Visual receptors Occupiers of homes Users of outdoor recreational facilities where landscape value is important or integral to that activity (e.g. walkers of trails designed to enable the scenery to be enjoyed) Communities who have views of the landscape that they value highly

Receptor Importance/ Sensitivity	Ranking	Examples
Very high	E	Landscape receptors Landscape valued or designated for its landscape importance at international level (e.g. attracts foreign tourists) Wilderness landscape or other landscape with a very high degree of 'naturalness', remoteness/isolation and without any man-made features Visual receptors Homes and hotels purposely positioned/placed to take advantage of a view

Table 3-5: Ranking of Magnitude of Assessed Impacts on Visual Receptors and Landscape Character

Magnitude	Ranking	Examples
Very small	1	Small or imperceptible change in components of the landscape or introduction of a new element that is in keeping with the surroundings or no appreciable change to existing views
Small	2	Development would result in minor changes in views without affecting overall quality of views Minor permanent change in the landscape – new element is only slightly out of character, existing landscape quality is maintained Temporary change where baseline landscape character is predicted to be restored within 1–2 years
Medium	3	The development would result in a noticeable change in the existing view and or would cause a noticeable change in the quality and/or character of the view Permanent changes in the landscape predicted in a localised area; new element may be prominent, but not significantly uncharacteristic Temporary changes where baseline landscape character is predicted to be restored in 2–5 years
Large	4	The development would result in a prominent change in the existing view and/or would cause a prominent change in the quality and/or character of the view Permanent changes over an extensive area and/or new development that will result in significant negative change to the existing landscape character (e.g. because of loss of key elements of the existing landscape, or introduction of elements that are uncharacteristic compared to existing features) Temporary changes where baseline landscape character is predicted to be restored in 5–10 years
Very large	5	Development will dominate the view or result in a dramatic change to the quality and/or character of the view Permanent change over an extensive area and/or introduction of elements that will fundamentally change the landscape character Temporary changes where restoration of baseline landscape character is predicted to take longer than 10 years

Surface water

The significance of any potential impact on water quality and quantity will depend on the current (or designated) use of the resource (e.g. for drinking water, irrigation, industrial process water, fishing, domestic use) or its importance to ecology and the nature and magnitude of change caused by the Project. Table 3-6 below therefore defines receptors with regard to the use they make of the water resource or the ecological importance of the resource.

For pipeline and facility construction activities, there are likely to be three main types of impact:

- Planned discharges of treated sanitary sewage and process wastewater (e.g. stormwater run-off from construction camps, run-off from vehicle wash-down areas and hydrostatic test water)
- Disturbance of watercourses directly through physical works, and indirectly due to run-off containing suspended solids from working and reinstated areas
- Accidental events or pollution.

Planned discharges will be treated to specified Project standards that are defined in Chapter 6 (Policy, Legal and Administrative Framework), Tables 6-5 to 6-11.

The magnitude of these impacts to water quality (and secondary impacts to water users) are therefore based largely on compliance with these discharge standards, together with the impact on the quality of the receiving watercourse, again as defined following a review of available standards and guidance, see Chapter 6 (Policy, Legal and Administrative Framework), Table 6-7.

The other types of impact do not lend themselves to being quantified easily in terms of standards or impact prediction. Table 3-7 therefore includes several descriptions of potential scenarios/impacts to facilitate reaching an assessment of impact magnitude.

Table 3-6: Importance/Sensitivity of Surface Water Resources and Users

Receptor Importance/Sensitivity	Ranking	Examples
Very low	A	Highly polluted watercourses, e.g. those with severely restricted or impoverished ecosystems or biology restricted to pollution tolerant species Watercourses with no community use or only used for low grade industrial use Fish are absent or only present on a sporadic basis
Low	B	Watercourses with some pre-existing pollution that limit their use or value for wildlife or communities Low-level use of water for agriculture or industry Cyprinid fish are present in low numbers
Medium	C	River used for recreational fishing or bathing Water used extensively for agriculture Watercourse supports a good cyprinid fish population
High	D	Watercourse of high quality, e.g. close to its natural state or close to that expected for an unpolluted river Watercourse that is an important constituent of, or supports, an area or a species valued or designated for its ecological

Receptor Importance/Sensitivity	Ranking	Examples
		importance at national level Watercourse used for drinking or domestic use, e.g. washing and cooking, by a small number of users Watercourse supporting salmonid fish Watercourse supporting a commercial or subsistence fishery Watercourse that crosses an international boundary within the Project Area of Influence Area at risk of flooding
Very high	E	Watercourse of very high quality, e.g. in its natural state or corresponding to that expected for an unpolluted river Watercourse that is an important constituent of, or supports, an area or a species valued or designated for its ecological importance at international level Watercourse used for drinking or domestic use, e.g. washing and cooking, by a large number of users Watercourse that supports a very good salmonid fishery

Table 3-7: Ranking of Magnitude of Predicted Impacts on Surface Water

Magnitude	Ranking	Examples
Very small	1	Direct or indirect impacts largely not discernible No effect on users Spill or accidental event that causes immediate area damage only and can be restored to an equivalent capability in a period of days or up to a month, i.e. full restoration is achieved as a result of immediate clean-up operations
Small	2	Project effluent/discharge within effluent quality standards and does not breach ambient environmental quality standard for the receiving watercourse Physical disturbance of watercourse limited to immediate working area Visible sediment and obscuration of watercourse bed observed for less than one week <15% decrease of downstream river flowrate for no more than one week Minor shift away from baseline conditions. Direct or indirect impacts will be discernible but use and value of resource not impacted. Rapid return to baseline conditions on completion of Project activities (guide timescale: within 1–3 months depending on receptor) Spill or accidental event leading to immediate area or localised damage that may take up to 6months to restore to pre-existing capability/function

Magnitude	Ranking	Examples
Medium	3	Visible sediment and obscuration of watercourse bed observed for 1–3 weeks after completion of construction <15% decrease of downstream river flowrate for more than one week or 15–40% decrease of downstream river flowrate for no more than 1 week Direct or indirect impacts to users or the value of the resource such that character/composition/ attributes of the resource temporarily changed and/or use temporarily affected or restricted but the overall integrity of the resource is not threatened. Guide timescale for return to baseline conditions: 3–6 months depending on receptor Spill or accidental event leading to immediate area or localised damage that may take six months to one year to restore to pre-existing capability/function Spill or accidental event leading to widespread damage that may take up to six months to restore to pre-existing capability/function
Large	4	Project effluent/discharge breaches effluent quality standards or ambient environmental quality standard for the receiving water body but rapidly diluted Visible sediment and obscuration of watercourse bed observed for more than three weeks but less than three months after construction 15–40% decrease of downstream river flowrate for more than one week or >40% decrease of downstream river flowrate for no more than one week Project causes temporary flooding over a small area Direct or indirect impacts to other users or the value of the resource such that character/ composition/ attributes of the resource post development are changed, threatening the overall integrity of the resource, or use by others significantly restricted on a temporary basis. Guide timescale for return to baseline conditions: 6–12 months Spill or accidental event leading to localised damage that cannot be restored to pre-existing capability/function within one year Spill or accidental event leading to widespread damage that may take six months to one year to restore to pre-existing capability/ function
Very large	5	Project effluent/discharge breaches effluent quality standards or ambient environmental quality standard for the receiving water body and receiving water body has poor dilution capacity Visible sediment and obscuration of watercourse bed observed for more than three months after construction >40% decrease of downstream river flowrate for more than one week Project causes temporary flooding over a large area Total loss or very major alteration to key elements/features of watercourse such that post development character/composition/ attributes will be fundamentally changed and may be lost altogether or use by others permanently impacted. Guide timescale for return to baseline conditions: 12 months or more Spill or accidental event leading to widespread damage that cannot be restored to pre-existing capability/function within one year

Groundwater

The significance of any potential impact on groundwater quality and quantity will depend on the current (or designated) use of the resource (e.g. for drinking water, irrigation, industrial process water, domestic use) or its importance to ecology and the nature and magnitude of change caused by the Project. Table 3-8 below therefore defines receptors with regard to the use they make of the water resource or the ecological importance of the resource.

For pipeline and facility construction activities, there will be three main types of potential impact. Note that there are currently no planned discharges to groundwater:

- Potential impacts on groundwater quality or quantity due to dewatering of the trench in areas of high groundwater, abstraction for use during construction
- Disturbance of groundwater directly through physical works or construction through aquifers, where non-open cut crossing methods are used
- Accidental events or pollution.

These impacts do not lend themselves to being easily quantified. Table 3-9 below therefore includes several descriptions of potential scenarios/impacts to facilitate reaching an assessment of impact magnitude.

Table 3-8: Importance/Sensitivity of Groundwater Resources and Users

Receptor Importance/ Sensitivity	Ranking	Examples
Very low	A	Non-aquifer (soil/geology with no groundwater resource) Very low quality groundwater/groundwater not used by the community
Low	B	Groundwater with some pre-existing pollution that limits its use or value for wildlife or communities
Medium	C	Groundwater used for industrial purposes or agriculture Groundwater that provides baseflow to surface watercourses used for recreational fishing or bathing Springs and wells
High	D	Groundwater of high quality Groundwater resource that is an important constituent of, or supports, a wetland designated for its ecological importance at national level Groundwater that provides baseflow to a watercourse defined as a high value receptor in Table 3-6 Aquifer that crosses an international boundary within the Project Area of Influence Area at risk of flooding Groundwater used for health/spa treatments Aquifer used for drinking or domestic use (e.g. washing, cooking, bathing) by a small number of users

Receptor Importance/ Sensitivity	Ranking	Examples
Very high	E	Watercourse or groundwater resource that is an important constituent of, or supports, a wetland designated for its ecological importance at international level Groundwater that provides baseflow to a watercourse defined as a very high value receptor in Table 3-6 Aquifer used for drinking or domestic use (e.g. washing, cooking, bathing) by a large number of users

Table 3-9: Ranking of Magnitude of Predicted Impacts on Groundwater

Magnitude	Ranking	Examples
Very small	1	Direct or indirect impacts largely not discernible No effect on users Spill or accidental event that causes immediate area damage only and can be restored to an equivalent capability in a period of days up to a month, i.e. full restoration is achieved as a result of immediate clean-up operations
Small	2	Groundwater abstraction does not exceed recharge rate Spill or accidental event leading to immediate area or localised damage that may take up to six months to restore to pre-existing capability/function
Medium	3	Groundwater abstraction exceeds the natural low flow groundwater recharge rate but users and groundwater levels within any receiving water body, river or wetland are not affected and saline intrusion does not occur Spill or accidental event leading to immediate area or localised damage that may take six months to one year to restore to pre-existing capability/function Spill or accidental event leading to widespread damage that may take up to six months to restore to pre-existing capability/function
Large	4	Groundwater abstraction exceeds the natural high flow groundwater recharge rate leading to minor changes of groundwater levels within any receiving water body, river or wetland but not to saline intrusion Project causes temporary flooding over a small area Direct or indirect impacts to other users or the value of the resource such that character/composition/attributes of the resource such that post-development character/composition/attributes changed or use by others significantly restricted on a temporary basis Spill or accidental event leading to localised damage that cannot be restored to pre-existing capability/function within one year Spill or accidental event leading to widespread damage that may take six months to one year to restore to pre-existing capability/function

Magnitude	Ranking	Examples
Very large	5	Groundwater abstraction exceeds the natural high flow groundwater recharge rate leading to significant depletion of groundwater levels within any receiving water body, river or wetland and/or to saline intrusion Project causes temporary flooding over a large area Total loss or very major alteration to key elements/features of watercourse or aquifer such that post development character/ composition/attributes will be fundamentally changed and may be lost altogether or use by others permanently impacted. Spill or accidental event leading to widespread damage that cannot be restored to pre-existing capability/function within one year

Ecology

Ecological impacts have been evaluated taking account of the following factors:

- The magnitude of the impact, as determined by its intensity, its extent in space and time
- The vulnerability of the habitat or species to the change caused by the impact
- The ability of that species or habitat to recover
- The value, in nature conservation and ecological terms of affected receptors including species, populations, communities, habitats, landscapes and ecosystems.

Both indirect and direct impacts are included in the assessment of the significance of impacts – for example, the loss or alteration of a feeding area for a rare bird and impacts on a protected area off-site because they are connected to the pipeline route, e.g. by a watercourse. Impacts on species behaviour or interactions have also been assessed, for example, consideration of impacts from noise and lighting.

The scientific value of habitats for nature conservation is assessed according to widely accepted criteria of which the most important are naturalness, extent, rarity and diversity. These and others are described in an extensive literature (Ratcliffe, 1977; Usher, 1986). Rarity and extent are assessed at several scales: in the context of occurrence on the proposed pipeline route and facility locations, in the context of the surrounding ecosystem, and at a national and international scale. For example, habitats that are rare at an international scale would be considered the most important for nature conservation, while habitats that are rare on the proposed pipeline route or facility locations, but common in the context of the surrounding ecosystem, would be considered important at a site level. The ability of habitats to recover from change is also assessed based on the experience gained from monitoring of the BTC and SCP pipelines following construction.

The ecological importance of species is assessed according to two main criteria:

- International significance according to the IUCN Red List of threatened species
- Species listed in the Country Red Data Book.

Table 3-10 defines the ecological receptors with regard to sensitivity, taking into consideration the value and ecological importance of different habitats and species. Table 3-11 defines the magnitude of the potential impact, including several descriptions of potential scenarios/impacts to facilitate reaching an assessment of impact magnitude.

Table 3-10: Importance/Sensitivity of Ecological Receptors

Receptor Importance/ Sensitivity	Ranking	Examples
Very Low	A	Commonly occurring habitats and species, not subject to significant decline Habitats that are already disturbed or which are periodically subject to natural disturbance (e.g. arable fields or areas affected by existing infrastructure/development)
Low	B	Sites of local biodiversity value but not intact, fragile or unique Wildlife corridors Habitats that recover quickly following disturbance (i.e. habitats comprising species that readily re-colonise disturbed areas such as ruderal vegetation) Widespread common species with low biodiversity value and not listed on the CITES, IUCN or Georgian Red List Species
Medium	C	Sites of regional importance Habitats that are suffering significant decline at a national or regional level Habitats of high species or habitat diversity or 'naturalness' Habitats that are capable of unassisted recovery to natural conditions following disturbance, although this may require several years (e.g. reed swamps and other habitats where growing conditions are favourable) Sites of research or educational value Regionally important (in the country context) population of a species, either because of population size or distributional context Species in significant decline at national or regional level Species listed as rare at country level (i.e. listed in the country Red Data Book) or species listed on the IUCN Red List that either: ○ occur on the proposed route or facility locations but are unlikely to be affected by it (e.g. owing to large populations off the route or type of use of the area, such as raptors foraging over, but not breeding on, the route), or ○ are unlikely to be present on the pipeline route or at facility locations

Receptor Importance/ Sensitivity	Ranking	Examples
High	D	Sites designated for protection at national level Habitats recognised as intact or unique (e.g. true deserts, fragile soils, coastal areas, estuaries and wetlands) or areas recognised by NGOs as having high environmental value (e.g. key bird areas) Habitats that are unlikely to return to natural conditions without some intervention (such as re-seeding or planting), but which are capable of assisted recovery (including most semi-deserts) Species listed as rare at country level (i.e. listed in the country Red Data Book) or species listed on the CITES, IUCN that have either been recorded on the pipeline route or facility area or are likely to be present, based on known distribution and habitat availability, and are likely to be affected by it. The presence of a nationally important population of a species on the pipeline route or which could be affected indirectly
Very high	E	Sites of international importance/designated for protection at international level Areas recognised as intact and fragile and unique or areas recognised by NGOs as having high environmental value Habitats that are very difficult to restore to natural conditions (even with biorestoration) such as salt-deserts and arid deserts Species that are rare at an international level Natural or critical habitat as defined in IFC P-S 6[1]

[1] Natural habitats are land and water areas where the biological communities are formed largely by native plant and animal species, and where human activity has not essentially modified the area's primary ecological functions. Habitat may be considered to be critical by virtue of (i) its high biodiversity value; (ii) its importance to the survival of endangered or critically endangered species; (iii) its importance to endemic or geographically restricted species and sub-species; (iv) its importance to migratory or congregatory species; (v) its role in supporting assemblages of species associated with key evolutionary processes; (vi) its role in supporting biodiversity of significant social, economical or cultural importance to local communities; or (vii) its importance to species that are vital to the ecosystem as a whole (keystone species).

Table 3-11: Ranking of Magnitude of Predicted Ecological Impacts

Magnitude	Ranking	Examples
Very small	1	Direct or indirect impacts on habitat and species largely not discernible Less than 1% of a habitat is within the Project area of influence[1]
Small	2	Minor shift away from baseline conditions. Direct or indirect impacts will be discernible but underlying character/composition/ attributes of baseline condition will be similar to pre-development circumstances/patterns Minor disruption[2] of behaviour or species interactions not impacting overall health/integrity of the population of the species Affects a specific group of localised individuals within a population over a short time period (one generation or less), but does not affect other trophic levels or the population itself Approximately 1–5% of habitat affected within the Project area of influence

Magnitude	Ranking	Examples
Medium	3	Direct or indirect impacts to one or more key elements/features of the baseline conditions (habitat and/or species) such that post-development character/composition/ attributes of baseline will be partially changed but the overall integrity[3] of the habitat or species is not threatened Affects a portion of a population and may bring about a change in abundance and/or distribution over one or more generation, but does not threaten the integrity of that population or any population dependent on it Approximately 5–20% of a habitat is within the Project area of influence
Large	4	Major direct or indirect impacts to key elements/features of the baseline conditions such that post-development character/composition/attributes will be fundamentally changed and the overall integrity of the habitat or species is threatened Affects an entire population or species in sufficient magnitude to cause a decline in abundance and/or change in distribution beyond which natural recruitment (reproduction, immigration from unaffected areas) would not return that population or species, or any population or species dependent upon it, to its former level within several generations Approximately 20–80% of a habitat is within the Project area of influence Introduction of alien invasive species
Very large	5	Total loss or very major alteration to key elements/ features of the baseline habitat or a species such that post-development character/composition/ attributes will be fundamentally changed and may be lost altogether Affects an entire population or species in sufficient magnitude to cause a permanent decline in abundance and/or change in distribution >80% of a habitat is within the Project area of influence

[1] The area of influence is the overall area affected by the Project, including, for example, construction camps and lay-down areas. The percentage of habitat impacted is by reference to the national area of such habitat. In practice it is not possible, nor is it intended to try, to calculate these percentages. Instead, this criteria is used to provide an approximate indication, based on professional judgement and available knowledge, of the proportion of any one type of habitat that may be affected, primarily for the purposes of highlighting where a large proportion of a habitat is affected.

[2] Disruption due to physical changes, noise, visual intrusion and air emissions behaviour on, for example, breeding, nesting, mating/spawning, diurnal and seasonal migration, hibernation, territorial activities, predator-prey relationships and, ultimately, mortality.

[3] Ecological integrity includes issues such as loss of habitat, fragmentation of habitat, disruption and loss of wildlife corridors, and ecological carrying capacity.

Air quality

The main sources of emissions to air during construction are likely to be dust, vehicle emissions and emissions from sources such as temporary generators at construction sites and work camps. With regard to emissions during operation other than dust, the key concern is the potential impact to human health due to carbon monoxide (CO), nitrogen oxides (NO_x). Sulphur oxides (SO_x) and fugitive hydrocarbons emissions are considered to be of a scale or longevity to have no more than a highly localised and minor air quality effect as the Project is not burning liquid fuels in significant quantities during operations.

With regard to dust during construction this can have “nuisance” impacts (soiling, visual amenity), lead to reductions in crop productivity and adverse ecological impacts depending on the scale of dust emissions and the sensitivity of the flora and fauna affected. It is difficult to predict dust impacts as these depend on the duration and location of construction activities, meteorological conditions, soil and subsoil type, and background dust levels.

However, by their nature, construction activities are of limited duration. Dust impacts are also likely to be localised, very site-specific and often difficult to directly attribute to the Project: UK guidance for the environmental assessment of roads (Highways Agency, *Design Manual for Roads and Bridges*, Volume 11, Chapter 3, Part 1. HA207/07' Air Quality. Paragraph 3.45) requires the identification of receptors up to a distance of 200m from a construction site.

There are no international or European Union accepted standards for nuisance dust emissions, so the criteria in Table 3-12 are largely qualitative and require professional judgement to assign the appropriate ranking. Health impacts are possible where dust particles are below 10µm diameter and the relevant air quality standards for this are referenced, see Table 3-13.

The assessment of the impacts of emissions during operation considers potential impacts on both human health and ecologically sensitive areas against the Project standards that are listed in Chapter 6 Policy, Legal and Administrative Framework, Table 6-11.

In defining the descriptors for impact magnitude, receptor significance and overall significance, Environmental Protection UK's guidance has been used (Environmental Protection UK, 2010, 'Development Control: Planning for Air Quality', which in turn relies heavily on input from the Institute of Air Quality Management (2009, 'Position on the Description of Air Quality Impacts and the Assessment of their Significance'). IAQM states: "As a discipline air quality is not well suited to the rigid application of generic significance matrix to determine the overall significance of a development with respect to effects at air quality sensitive receptors." It stresses that professional judgement is a key factor in ascertaining the overall significance, and gives some factors to consider in making such judgements. This approach has been adopted. The descriptors in the following tables should be considered, therefore, as guidelines suitable only for screening to identify potentially significant impacts, after which a detailed assessment is done of any medium- and high-level impacts. Particular caution is needed with regard to rigid application of the magnitude criteria for short-term impacts as much depends on how often and for what length of time short-term limits are exceeded.

Table 3-12: Importance/Sensitivity of Receptors for Air Emissions

Receptor Importance/ Sensitivity	Ranking	Examples
Very low	A	For Dust: Areas where people would not normally be found – exposure is unlikely Grazing or unused land Fauna not susceptible to dust emissions For organic and inorganic emissions: Baseline annual average NO_2/PM_{10}/benzene concentrations <50% of EAL (NO_2 EAL = 40µg/m^3, PM_{10} EAL = 20µg/m^3, benzene EAL = 5µg/m^3)

Receptor Importance/ Sensitivity	Ranking	Examples
Low	B	For Dust: Areas where people might be expected to pass through, but exposure for any extended period is unlikely (e.g. nomadic graziers, workers in agricultural fields) Crops and vegetation with high tolerance of dust emissions, e.g. cereal, animal feed crops Fauna of low susceptibility to dust emissions, e.g. highly mobile mammals For organic and inorganic emissions:Baseline annual average NO_2/PM_{10}/benzene concentrations 50–75% of EAL
Medium	C	For Dust: Areas or buildings where occasional longer periods of exposure may occur Crops and vegetation with moderate susceptibility to dust, e.g. crops with rough leaves Fauna of moderate susceptibility/moderate tolerance of dust emissions For organic and inorganic emissions: Baseline annual average NO_2/PM_{10}/benzene concentrations 75–90% of EAL
High	D	For Dust: Areas or buildings such as schools, offices, shops, markets where exposure will be substantial, but not constant Crops, vegetation and fauna of high susceptibility/low tolerance of dust emissions, e.g. greenhouses, nurseries, horticulture and fruit crops Ecological sites designated at national level For organic and inorganic emissions: Baseline annual average NO_2/PM_{10}/benzene concentrations 90–100% of EAL
Very high	E	For Dust: Residential buildings (including hospitals) where near-constant presence of people is possible and long-term exposure to dust is likely Crops, vegetation and fauna of very high susceptibility/very low tolerance of dust emissions, e.g. epiphytic lichen and sphagnum Ecological sites designated at international level For organic and inorganic emissions: Baseline annual average concentrations of NO_2/PM_{10}/benzene exceeding the applicable EALs

Table 3-13: Ranking of Magnitude of Impacts of Emissions to Air

Magnitude	Ranking	Examples
Very small	1	Project/process contributions plus existing background concentrations are <5% of the standards noted in Table 3-12 No visible increase in dust levels Temporary combustion emissions during construction
Small	2	Project/process contributions plus existing background concentration is 5–20% of the standards noted in Table 3-12 Visible increase in dust levels not predicted to cause a nuisance, lead to complaints or adverse health impacts
Medium	3	Project/process contributions plus existing background concentration is 20–50% of the standards noted in Table 3-12 Dust is a nuisance to people or may cause minor property, crop or ecological damage
Large	4	Project/process contributions plus existing background concentration is >50% of the standards noted in Table 3-12 Dust is a significant nuisance to people or will cause measurable but not significant health effects, or moderate property, crop or ecological damage
Very large	5	Project/process contributions plus existing background concentration is >70% of the standards noted in Table 3-12 Dust is a very significant nuisance to people or will cause significant health effects or significant damage to property or crops

Noise

During construction the main sources of noise emissions are likely to include the operation of heavy machinery along the pipeline ROW and at the facilities, vehicle movements to and from the ROW and facility construction sites and noise associated with the construction camps, for example, from the operation of temporary generators. During operation the main sources of noise will be from equipment operation at the facilities, predominately at CSG1 and CSG2.

Noise from continually operating plant under normal conditions has been assessed against night-time background levels as the most stringent criteria. The representative background night-time noise level has been defined as the time between 00:00 and 05:00. This time is considered to be the quietest as the noise environment would be less effected by human activity and the dawn chorus. Maintenance venting events have been assessed based upon the maximum noise level predicted at the façade of sensitive receptors utilising internal (WHO) and UK (BS 8233) criteria. Given the expected infrequency of emergency venting and the health and safety priority of such an event, it would be considered inappropriate to assess this noise source based on internal noise criteria, which has been formulated to protect against long-term health effects. Therefore, emergency venting has been assessed against occupational noise criteria (The Control of Noise at Work Regulations 2005) to ensure that nearby sensitive receptors would be protected against any possibility of hearing damage.

For construction activities greater than one month, the guidelines within BS 5228-1:2009 ‘Code of practice for noise and vibration control on construction and open sites. Noise’ has been used. For construction noise activities less than one month in duration such as nitrogen venting, the aim will be to meet these limits where practicable and noise has been assessed against these limits, despite not being strictly applicable.

The tables below consider temporary (construction phase), permanent (operation phase), planned (maintenance) and unplanned (emergency) transient noise impacts of the pipeline and facilities have been developed from acceptable noise emissions derived from a review of appropriate guidance. Impacts of noise on fauna are assessed in Table 3-11.

Table 3-14: Importance/Sensitivity of Noise Receptors

Receptor Importance/ Sensitivity	Ranking	Examples
Very low	A	Visitors and Project workforce No other human receptors
Low	B	Other workers outside of the Project site and/or not engaged in Project work (i.e. not part of the Project workforce)
Medium	C	Residents
High	D	Schools
Very high	E	Hospitals, homes for the elderly

Table 3-15: Ranking of Magnitude of Noise Emissions

Ranking of magnitude of predicted noise emissions		
Magnitude	**Ranking**	**Examples**
Very small	1	During construction, total noise level (ambient and construction) raised by <5 dB(A) and less than 65 dB(A) outside dwellings between agreed daytime working hours and a limit of Leq, 1 hour 45 dB(A) at night During operation, continuous noise + tonal correction are < 42dB(A) outside dwellings and < 3 dB(A) above background noise levels. Maintenance venting noise L_{Amax} <50 dB(A) at the façade of receptor. Emergency venting weekly exposure level $L_{EP,w}$ <70 dB(A) and L_{Cpeak} <137 dB(A) at the receptor.
Small	2	During construction, total noise level (ambient and construction) raised by <5 dB(A) or less than 65 dB(A) outside dwellings between agreed daytime working hours and a limit of Leq, 1 hour 45 dB(A) at night. During operation, continuous noise + tonal correction are < 42dB(A) outside dwellings or < 3 dB(A) above background noise levels, where existing noise levels already exceed 42 dB(A). Maintenance venting noise L_{Amax} 50-60 dB(A) at the façade of receptor. Emergency venting weekly exposure level $L_{EP,w}$ 70–80 dB(A) and L_{Cpeak} <137 dB(A) at the receptor.

Medium	3	During construction, total noise level (ambient and construction) raised by 5–10 dB(A) and more than 65 dB(A) outside dwellings between agreed daytime working hours and a limit of Leq, 1 hour 45 dB(A) at night. During operation, continuous noise + tonal correction are > 42dB(A) outside dwellings and 3–5 dB(A) above background noise levels. Maintenance venting noise L_{Amax} 60–65 dB(A) at the façade of receptor. Emergency venting weekly exposure level $L_{EP,w}$ 80–85 dB(A) or L_{Cpeak} >137 dB(A) at the receptor.
Large	4	During construction, total noise level (ambient and construction) raised by >10 dB(A) and more than 65 dB(A) outside dwellings between agreed daytime working hours and a limit of Leq, 1 hour 45 dB(A) at night. During operation, continuous noise + tonal correction are > 42 dB(A) outside dwellings and 5–10 dB(A) above background noise levels. Maintenance venting noise L_{Amax} 65–70 dB(A) at the façade of receptor. Emergency venting weekly exposure level $L_{EP,w}$ 85–87 dB(A) or L_{Cpeak} 137-140 dB(A) at the receptor.
Very large	5	During construction, total noise level (ambient and construction) raised by >10 dB(A) and more than 75 dB(A) outside dwellings between agreed daytime working hours and a limit of Leq, 1 hour 55 dB(A) at night. During operation, continuous noise + tonal correction are > 42 dB(A) outside dwellings and >10 dB(A) above background noise levels. Maintenance venting noise L_{Amax} >70 dB(A) at the façade of receptor. Emergency venting weekly exposure level $L_{EP,w}$ >87 dB(A) or L_{Cpeak} >140 dB(A) at the receptor.

Vibration

Vibration levels from most construction activities are negligible. However, there is potential for blasting, piling and heavy goods vehicle (HGV) traffic to cause vibration. This can cause annoyance (nuisance) or disturbance of people and, in exceptional circumstances assuming buildings are properly constructed, building damage. Archaeological sites and buildings in poor structural condition may be more sensitive to vibration damage.

Annoyance (nuisance) occurs at lower levels of vibration than building damage, so the tables below distinguish between human receptors and physical structures. To assess impact, the vibration values used in Table 3-17 consider BS 5228-2:2009 ‘Code of practice for noise and vibration control on construction and open sites. Vibration’ (for disturbance to humans) and BS 7385-2:1993 ‘Evaluation and measurement for vibration in buildings. Guide to damage levels from ground borne vibration’ (for effects on buildings).’ A precautionary approach to archaeological sites and buildings in poor condition and/or historic buildings is taken. Vibration levels will be determined based upon typical levels expected for each significant source of vibration and assessed for significance based on Table 3-16 and Table 3-17. Dependent on the source of vibration, distances from the source

will be identified at which the vibration effect would be considered negligible, see Chapter 10 Environmental and Social Impacts and Mitigations (Planned Activities).

Table 3-16: Importance/Sensitivity of Receptors for Vibration

Receptor Importance/ Sensitivity	Ranking	Human Disturbance	Building Disturbance
Very low	A	Visitors and Project workforce	Industrial structures and buildings Heavy public buildings
Low	B	Other workers outside of the Project site and/or not engaged in Project work (i.e. not part of the Project workforce)	
Medium	C	Residents	Multi-storey reinforced concrete building Timber residential buildings
High	D	Schools	Block or brick work residential buildings
Very high	E	Hospitals, homes for the elderly	Light and prefabricated constructions Historical buildings and archaeological sites Buildings containing equipment sensitive to vibration, e.g. recording equipment

Table 3-17: Ranking of Magnitude of Predicted Impacts from Vibration

Magnitude	Ranking	Human Disturbance	Building Disturbance
Very small	1	<0.14mm/s PPV[1]. Vibration unlikely to be perceptible	<0.6mm/s PPV: Cosmetic damage to building unlikely
Small	2	0.14–0.3mm/s PPV. Vibration might be perceptible in the most sensitive for most vibration frequencies associated with construction	
Medium	3	0.3–1.0mm/s PPV. Vibration might be perceptible	0.6mm/s–15mm/s PPV: Damage to buildings possible at frequencies < 4hz
Large	4	1.0–10mm/s PPV. Likely that vibration will cause complaint, but can be tolerated if prior warning and explanation has been given	15–20mm/s PPV: Damage to buildings possible at frequencies <15hz
Very large	5	>10mm/s PPV. Vibration likely to be intolerable for anymore than a very brief exposure to this level	> 20mm/s PPV: Damage to buildings possible at frequencies >15hz >0.6mm/s at an archaeological site

[1] Peak particle velocity

Cultural heritage

Information on archaeological features normally only becomes available during the construction phase of the Project owing to the intrusive nature of the process. Therefore, the assignment of accurate consequence/severity prior to the construction phase is often not possible. However, as the pipeline and facilities are close to the existing SCP line, many of the sites and their levels of importance can be more easily estimated. Nonetheless, it is not always possible to be precise about the significance and full impact on a site that has no surface expression, even when part of that site has been located within the area surveyed for the existing pipeline. The view of the importance of such sites often changes as excavation work progresses and the full extent of a site and therefore, the level of impact, requires knowledge of the extent of a site.

Table 3-18 recognises importance and sensitivity of the cultural heritage assets. Table 3-19 determines the magnitude of the impact by taking into account the protected status and state of preservation of remains and the potential for destruction of archaeological remains. Table 3-19 also recognises that conducting thorough surveys for cultural heritage may have a positive/beneficial impact by contributing to the understanding of archaeology in the area, increasing public awareness and contributing to local records.

The cultural heritage assessment is based upon International Finance Corporation (IFC) Performance Standard 8 and considers the criteria from Part 2 HA 208/07 Cultural Heritage of the Highways Agency's (UK) 'Design Manual for Roads and Bridges'. This last document is taken as the model from which the majority of assessments in the UK and Europe are performed.

Table 3-18: Importance/Sensitivity of Cultural Heritage Assets

Receptor Importance/ Sensitivity	Ranking	Examples
Very low	A	Assets with very little or no surviving archaeological interest, e.g. sites that have been previously heavily damaged, or destroyed
Low	B	Designated and undesignated assets of local importance Assets compromised by poor preservation and/or poor survival of contextual associations Assets of limited value, but with potential to contribute to local research objectives, e.g. sites that have been ploughed and are under threat of continued destruction by ploughing
Medium	C	Designated or undesignated assets that are regionally important or contribute to regional research objectives
High	D	Assets protected under national legislation, sites that are on the protected monuments list Assets that can contribute significantly to acknowledged national research objectives
Very high	E	UNESCO World Heritage Sites designated for their cultural, historic or archaeological value (including nominated sites) Assets that can contribute significantly to acknowledged international research objectives
Unknown	-	The importance of the resource is not currently known, insufficient assessment has been carried out to determine this

Table 3-19: Ranking of Magnitude of Predicted Impacts on Cultural Heritage Assets

Magnitude	Ranking	Examples
Beneficial/ no change		Sites that were previously unknown or known but not previously surveyed and where survey or research as a result of the Project is predicted to lead to an increase in information/knowledge of benefit to researchers. No material change to the site. Applies to sites located in the study corridor outside the direct footprint of the Project
Very small	1	Very minor changes to archaeological materials, or setting (the visible environment around the site or feature) (guide: 1–10% of surviving deposits damaged or destroyed)
Small	2	Changes to key archaeological materials, such that the asset is slightly altered (guide: 10–25% of surviving deposits damaged or destroyed) Slight changes to setting
Medium	3	Changes to many key archaeological materials, such that the resource is clearly modified (guide: 25–50% of surviving deposits damaged or destroyed) Considerable changes to setting that affect the character of the asset
Large	4	Change to most of the key archaeological materials, such that the resource is significantly altered (guide: 50–75% of surviving deposits damaged or destroyed) Comprehensive changes to setting
Very large	5	Change to majority or all of the key archaeological materials, such that the resource is totally altered (guide: 75–100% of surviving deposits damaged or destroyed) Widespread changes to setting
Uncertain	-	The extent of data on the site/feature, or the nature of construction activities does not enable a determination of likely effects to be made at this stage

Social impacts

Potential social impacts can affect individuals, households and entire communities and they can be caused directly by Project activities (e.g. land take or job creation) or by environmental changes such as increased ambient noise levels, reductions in air quality and increased traffic. The significance of impacts depends on many variables including past experience and perception of previous impacts from Project development. In addition, local factors can be very important as individuals, households and communities vary in their sensitivity and reactions to actual or expected changes. People can also react to actual or expected changes and become part of impact cause–effect relationships thus altering the nature and progression of likely impacts.

For pipeline and facility construction there are likely to be a range of potential key impacts, of varying durations (many short-term) including:

- Land acquisition and restriction of access to natural resources (e.g. grazing or recreation areas) and adverse effects on livelihoods and incomes
- Economic changes affecting job opportunities, business viability and potential to enhance incomes
- Access to social and physical infrastructure facilities and/or services

- Increased risk of accidents and threats to individual life chances due to changes in traffic movements and type of traffic.

These can all be mitigated and/or enhanced by specific measures such as timely compensation of land acquisition and a labour recruitment policy favouring local workers.

There are virtually no standards or guide limits or criteria to assist evaluation of social impacts although key guidance to assist in assessing the magnitude and significance of social impacts is contained in the World Bank's social safeguard policies and procedures and in the IFC's Performance Standards on Social and Environmental Sustainability and accompanying Guidance Notes. However, international experience indicates certain types of impacts occur relatively frequently in most development contexts and are usually considered significant unless demonstrated convincingly to be otherwise in a specific context. These are impacts related to land acquisition and physical and economic displacement; threats to health likely to lead to increase in morbidity and mortality rates; permanent reductions in livelihood and life chances/options for improvement; intra- and inter- community conflict; and threats to human rights.

With regard to ranking of social receptor importance/sensitivity, guidance has been developed (Table 3-20) that includes consideration of access to resources (both physical, capital, financial and social), existing skills and experience of the labour pool (the group of people to which Project-related jobs will potentially be available), and individuals' opinions, concerns or perceptions related to Project activities.

With regard to assessment of the magnitude of impacts, separate tables have been developed to assess the impacts of land acquisition[1]; economic impacts and impacts on employment, skills and livelihoods; impacts on services and other infrastructure and community health and safety. Tables 3-21 to 3-23 include several descriptions of potential scenarios/impacts to facilitate reaching assessments of impact magnitude.

Table 3-20: Importance/Sensitivity of Social Receptors

Receptor Importance/ Sensitivity	Ranking	Examples
Very low	A	Individuals or households or communities that use affected resource(s) have access to nearby alternatives, the use of which does not cause adverse indirect impacts Highly skilled and experienced labour 'pool' Threats to health and well-being well understood by all adults who have experience of living and working in vicinity of pipeline construction and operations. Adults capable of advising/supervising children/young people accordingly No stakeholders expressed concern about the impact in the PACs
Low	B	Individuals or households or communities that use affected resource(s) have access to nearby alternatives, the use of which may cause limited adverse indirect impacts Highly skilled labour 'pool', but lack relevant experience Few stakeholders expressed concern about the impact in a small number of PACs

[1] Land acquisition refers to the permanent and temporary loss of use of the land by a farmer and any other users of the land (e.g. graziers, people who use vegetation on the land for fuel, etc.) and subsequent restrictions on use during pipeline and facility operation.

Receptor Importance/ Sensitivity	Ranking	Examples
Medium	C	Some individuals/households depend on the affected resource(s) and there are no nearby alternatives Limited skills in labour 'pool' with only limited experience Some households and business owners/operators perceive that a change will affect their ability to maintain their livelihood, store of resources or quality for a significant time period (>1 year) Threats to health and well-being posed by development-induced changes (increased traffic, trenches) understood by all adults, but no experience of living and working in vicinity of pipeline construction and operations. Adults capable of advising/supervising children/young people in general terms only A range of stakeholders expressed concern about the impact in some PACs
High	D	A community depends on the affected resource(s) and there are no nearby alternatives Many households and business owners/operators perceive that the change will affect their ability to maintain their livelihood or quality of life to an unacceptable extent Threats to health and well-being posed by development-induced changes (increased traffic, trenches) understood only by certain adults. These adults capable of advising/supervising children/young people in general terms only. Other children/young people unlikely to be advised/supervised adequately A high level of concern was expressed about the impact by NGOs and many stakeholders in most of the PACs
Very high	E	Many communities depend on the affected resource(s) and there are no nearby alternatives Lack of skilled and experienced labour 'pool' Threats to health and well-being posed by development-induced changes (increased traffic, trenches) not well understood by most adults. Unlikely that adults will advise/supervise children adequately Many households and business owners/operators perceive that the change will affect their ability to maintain their livelihood or quality of life to an unacceptable extent and may have to leave the area/community An extremely high level of concern was expressed about the impact by NGOs and a range of stakeholders in all PACs

Table 3-21: Ranking of Magnitude of Impacts of Land Acquisition

Magnitude	Ranking	Examples
Beneficial	-	N/A
Very small	1	Short-term (<6 months) inconvenience/decrease in the ability of landowners and users to exploit their land not involving loss of income, reduction in economic opportunities or options for improvement of the standard of living of affected households or individuals in a PAC Perception of possible missed opportunity to improve livelihoods or 'life chances'
Small	2	Temporary (<1 year) or intermittent negative changes to some aspects of the ability of landowners and users to exploit their land that do affect the livelihoods, economic opportunities or options for improvement of the standard of living of a limited number of affected individuals/households in a PAC, but to which most individuals/households are expected to be able to adapt relatively easily
Medium	3	Permanent reduction in the ability of landowners and users to exploit their land, such that economic displacement (as defined in IFC P-S 5) affects up to 20 individuals or households in a PAC Households and individuals in a PAC may be able to adapt to the loss or change of use of land, but the transition period will be difficult for some households/individuals
Large	4	Permanent reduction in the ability of landowners and users to exploit their land, such that economic displacement (as defined in IFC P-S 5) affects more than 20 individuals or households in a PAC Households/individuals in a PAC may be able to adapt, but the transition period will be difficult for most individuals/households Physical displacement (as defined in IFC P-S 5) of up to 5 households in a PAC
Very Large	5	Physical displacement (as defined in IFC P-S 5) of more than 5 households/businesses. Economic displacement affecting more than 50% of the households in a PAC The integrity of communities is threatened due to difficulties experienced by of a significant number of individuals/households in adapting to changes.

Table 3-22: Ranking of Magnitude of Impacts on Economy, Employment, Skills and Livelihoods

Magnitude	Ranking	Examples
Beneficial	-	Increased ability of individuals, households, businesses or communities to maintain or improve livelihoods through enhanced: • Financial and physical assets (such as savings and buildings) • Natural assets (such as land. water sources, and forests) • Human and social assets (such as skills, knowledge, community support networks) • Job opportunities, job security and enhanced *per capita* incomes • Economic diversification • Local business viability/opportunities. Harmonious and cooperative mutually beneficial working relationship between the SCPX Project and PACs

Magnitude	Ranking	Examples
Very small	1	Short-term (<6 months) inconvenience/decrease in business viability/opportunities and to households or individuals which pose an increased threat of loss of income, reduction in 'life chances' and options for improvement Perception of missed opportunity to improve livelihoods or 'life chances'
Small	2	Temporary (<1 year) or intermittent negative changes to some aspects of the livelihoods and life chances/options for improvement of a limited number of individuals/households/businesses (including job opportunities, and income, access to markets for produce sales), but to which most individuals/households are expected to be able to adapt relatively easily Some owners of businesses experience short-term (<1 year) financial loss, but recovery is likely in near future Temporary decrease in household/individual incomes resulting from reduction of jobs or hours worked, but recovery is likely in near future
Medium	3	Job losses and adverse effects on livelihoods in a community able to adapt and provide alternative job opportunities and reverse adverse livelihood changes in near - medium term (within 1 year of job losses)
Large	4	Job losses and loss of livelihoods in small communities with limited alternative opportunities in near-medium term (within 1 year from job losses) Change that has a differential adverse effect on the livelihoods or job opportunities/'life chances' of vulnerable groups (disabled, elderly, internally displaced persons (IDPs)/refugees, female-headed households and those living below officially defined poverty levels) Community(ies) may be able to adapt to job losses and/or income reductions, but the transition period will be difficult for most individuals/households Medium to long-term (>1 year) financial loss to owners of businesses where recovery may be difficult
Very Large	5	Local businesses close due to loss of income or are transferred to other locations Significant job losses and loss of livelihoods in communities (>30% of jobs or livelihoods) with no local alternative opportunities in near-medium term (within 1 year from job losses) other than out-migration Widespread perception of adverse impacts and/or missed opportunities to improve quality of life, resulting in frustration and disappointment leading to increased out-migration and threats to community integrity and viability Perceived permanent reduction in quality of life

Table 3-23: Ranking of Magnitude of Impacts on Infrastructure and Services

Magnitude	Ranking	Examples
Beneficial	-	Increased ability of individuals, households or communities to maintain or improve livelihoods and 'life chances' through enhanced Social infrastructure (such as clinics, schools, cultural centres) Physical infrastructure (such as roads and water supply networks)
Very small	1	Short-term changes in access to non-essential local social/physical infrastructure facilities/services, but acceptable alternatives are available
Small	2	Short-term changes in access to certain essential local social/physical infrastructure facilities/services, but acceptable alternatives are available
Medium	3	Restricted access to/receipt of non-essential local social/physical infrastructure facilities/services for a period of <6 months Temporary damage to non-essential infrastructure
Large	4	Restricted access to/receipt of essential local social/physical infrastructure facilities/services for a period of 6–12 months Temporary damage to essential infrastructure
Very large	5	Permanent restricted access to/receipt of essential local social/physical infrastructure facilities/services Permanent damage to infrastructure

Health impact assessment

The Project has carried out a parallel health impact assessment (HIA), which has been executed in close cooperation with the ESIA. This sub-section summarises the HIA methodology, which is based on the identification of the health impact and the probability (likelihood) of the impact occurring to determine the overall health risk. The HIA carried out a preliminary evaluation of a defined set of environmental health areas developed by the international oil and gas industry and international multilateral lending institutions to determine whether the Project had the potential to impact each area and therefore warranted further investigation. The EHAs listed in Table 3-24 were identified as having the potential for impact to occur and were therefore evaluated in detail within the HIA.

Table 3-24: Environmental Health Areas

Environmental Health Area (EHA)
Accidents/injuries: road traffic and community access to construction sites related injuries, spills and releases, community access to construction sites
Health services infrastructure and capacity
Exposure to potentially hazardous materials
Soil, water, sanitation and waste-related diseases
Non-communicable diseases
Social determinants of health (SDH)
Sexually transmitted infections
Housing and respiratory issues
Food and nutrition related issues
Zoonotic diseases
Vector-related disease
Programme management delivery systems

Each potential health impact has several different dimensions that were characterised to assist with determining impact significance and mitigation measures:

- Nature – direct, indirect, or cumulative
- Timing and duration – when (Project phase), i.e. construction, operations, decommissioning and how long (days, weeks, months, years, etc.)
- Frequency – the overall rate of occurrence within the defined time duration
- Extent – localities most likely to experience the projected impact (local, regional, national)
- Magnitude – intensity, particularly with regard to existing baseline conditions
- Significance – perception of risks by a potentially affected community
- Manageability or ability to influence risk responses ('proactive' or 'reactive').

For each EHA the potential impacts on community health and safety were evaluated to determine severity using the criteria below (Table 3-25).

Table 3-25: Health Impact Severity Classification

Potential Impact	Community Health Guidelines
Very high	Major explosion/release with direct impact to nearby communities
High	Major road traffic or aviation asset accident Widespread social impact Change in a morbidity outcome by 30% over baseline
Medium	Change in morbidity outcome by 10–30% over baseline Adverse local social impact
Low	Some disruption to local operations for less than 24 hours Health claims at local clinic, e.g. headaches, sneezing, cough, eye irritation
Very low	Isolated short term complaints from households, e.g. noise, odours, headaches, cough

The probability of each impact occurring was then evaluated on a graduated scale with 1 = remote and 8 = relatively common.

The combination of the impact severity and the probability of the impact occurring combines to give the overall health risk, which is part of a separate evaluation.

Traffic and transport

The approach for determining the significance of transport impacts (both road and rail) relates to the presence of sensitive receptors, as well as predicted changes caused by the Project in terms of the duration, scale and type of traffic generated.

The presence of receptors (e.g. built-up areas, villages, schools, pedestrians, etc.) is a prerequisite for impacts to occur with sensitive receptors being those most at risk, such as children and the disabled. With regard to magnitude of impact, the percentage increase in traffic flow, the number of traffic movements predicted to be generated, the timing of traffic movements, the nature of the traffic generated, the potential for accidents, and increased journey time, congestion or delays have all been considered.

Table 3-26: Importance/Sensitivity of Receptors for Project Traffic and Transport

Receptor Importance/ Sensitivity	Ranking	Examples
Very low	A	Roads/railway lines with no restrictions in relation to predicted traffic levels/traffic types Disused footpath

Receptor Importance/ Sensitivity	Ranking	Examples
Low	B	Roads/railway lines with minor restrictions (width, surface condition, visibility etc.) in relation to predicted traffic levels/traffic types Footpath or road used as a footpath used rarely by pedestrians
Medium	C	Roads/railway lines with moderate restrictions (width, surface condition, visibility etc.) and where some difficulties are predicted accommodating the types of traffic predicted Footpath or road used as a footpath used by pedestrians at least once a day
High	D	Roads/railway lines with major restrictions (width, surface condition, visibility etc.) in some areas and where significant difficulties are predicted accommodating the types of traffic predicted (e.g. where pedestrians are forced to walk on the road due to restrictions) Footpath or road used as a footpath several times a day by pedestrians Road side traders/markets with people in close proximity to moving traffic
Very high	E	Roads/railway lines with major restrictions along all/part of the route and where significant difficulties are predicted accommodating the types of traffic predicted Schools, hospitals or market stalls adjacent to the road Footpath or road used as a footpath in constant use by pedestrians or by children to go to school or patients to go to hospital

Table 3-27: Ranking of Magnitude of Predicted Impacts of Traffic and Transport

Magnitude	Ranking	Examples
Very small	1	No measurable permanent or temporary increase in traffic, traffic congestion, delays or accidents No night-time traffic No road or footpath closures or diversions
Small	2	An increase of less than 5%[1] on existing traffic flows during construction or operation or Project predicted no more than 15 two-way movements per hour or 50 two-way movements a day (i.e. per 24-hour period) No night-time traffic Minor increase in traffic congestion or delays Minor increase in the risk of traffic accidents Road or footpath closures or diversions impact individual houses rather than communities and /or involve minor roads or footpaths with low traffic volumes and/or are for no more than five days

Magnitude	Ranking	Examples
Medium	3	An increase of between 6 and 10%[1] on existing traffic flows during construction or operation or Project predicted to generate no more than 29 two-way movements per hour or 99 two-way movements a day Night-time traffic predicted but will pass individual houses rather than communities Moderate temporary but no significant permanent increase in traffic congestion or delays Moderate temporary but no significant permanent increase in the risk of traffic accidents Road or footpath closures or diversions impact a single community and/or involve roads or footpaths with moderate traffic volumes and/or are for 5–10 days Moderate temporary increase over existing levels in HGV movements on the road but no/minor permanent increase Transport of hazardous substances that could cause health and safety or environmental damage if spilled following an incident Project traffic may lead to deterioration in road condition or rails requiring minor repairs (e.g. filling in pot holes)
Large	4	An increase of between 11 and 20%[1] on existing traffic flows during construction or operation or 30 or more two-way movements per hour or 100 or more two-way movements a day Night-time traffic predicted through villages or towns but where existing night-time traffic flows are high High temporary but no significant permanent increase in traffic congestion or delays High temporary but no significant permanent increase in the risk of traffic accidents Road or footpath closures or diversions impact more than one community and /or involve roads or footpaths with high traffic volumes and/or are for more than 10 days High temporary increase over existing levels in HGV movements on the road but no/minor permanent increase. Project traffic may lead to deterioration in road condition requiring substantial repairs (e.g. resurfacing)
Very large	5	An increase of more than 20%[1] during construction or operation or Project predicted to generate 60 or more two-way movements per hour or 200 or more two-way movements a day Night-time traffic predicted through villages or towns where existing night-time traffic flows are low Significant permanent increase in traffic congestion or delays Significant permanent increase in the risk of traffic accidents Road or footpath closures or diversions impact a raion/rayon or larger area Significant permanent increase in HGV movements on the road Project traffic may lead to deterioration in road condition requiring road rebuilding

[1] Latest guidance on assessing traffic impacts in the UK uses the number of traffic movements generated by the Project (30 or more two-way trips an hour or 100 per day) rather than the percentage increase in traffic generated by the development as the criteria for determining whether further assessment of the impacts of a Project are necessary (Department for Transport (2007) *Guidance on Transport Assessment*). This is due to the fact that the previous guidance had the effect of encouraging development to locate on busy roads with high existing traffic levels where the percentage increase in traffic was correspondingly low. However, consideration of the percentage increase is still a useful guide to identifying the potential impacts of traffic when combined with consideration of other factors such as road condition so has been retained as one of the criteria.

3.9.7 Evaluating Significance of Residual Impact

The residual environmental and social impacts are assigned a level of significance based on the importance/sensitivity of the receptor and the magnitude of that impact. For each residual impact, an importance/sensitivity ranking between A and E and an impact magnitude ranking of between 1 and 5 have been assigned using the tables in Section 3.9.6. The significance level of the residual impact is then determined using the matrix below (Figure 3-3).

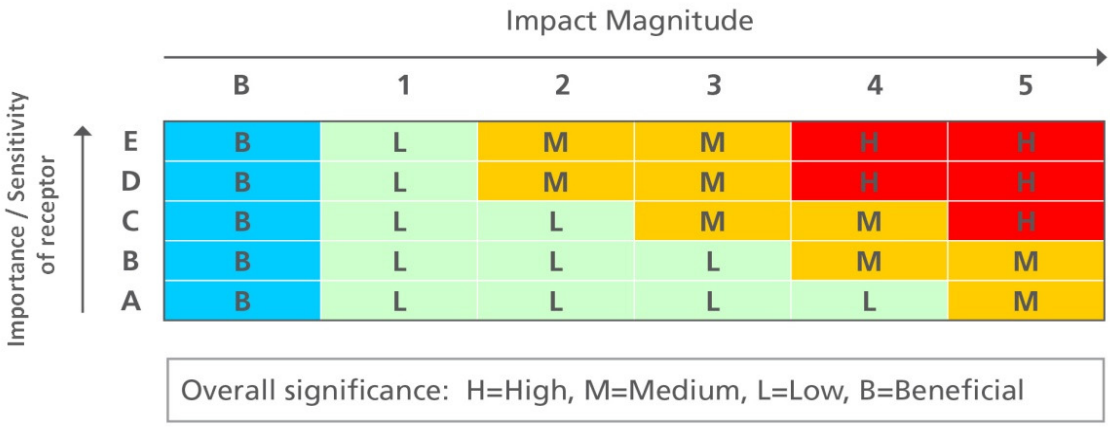

Figure 3-3: Significance Matrix

All residual impacts identified from the impact assessment have been given a significance ranking in the ESIA (see Appendix B) in line with the methodology described in this section. As noted previously this is a relative assessment and the terms low, medium and high represent a comparative scale. Where an impact is of medium or high significance it is addressed in greater detail in the text of Chapter 10 (Environmental and Social Impacts and Mitigation (Planned Events)), to explain how the mitigation hierarchy has been applied (and where appropriate the other mitigation options considered in the assessment and the reasons for their rejection) to reduce the impact to a level that is deemed to be as low as reasonably practicable in risk assessment terms, though not in a legal sense. Beneficial impacts are also be described in more detail in the text of Chapter 10, as are impacts of low significance that are deemed to warrant further explanation.

3.10 Environmental and Social Hazard and Risk Assessment

Environmental hazard and risk assessment (EHRA) and social risk assessment (SRA) are processes whereby the ESIA team can:

- Confirm its understanding of the Project with the design engineers
- Identify to the design engineers areas of potential environmental concern

- Jointly develop alternatives so that potential impacts can be avoided where possible or proactively mitigated.

EHRA/SRA issues were discussed with key Project engineers and HSE advisers. These discussions were facilitated both by members of the ESIA team and the pipeline and facilities engineering team during the design process. These discussions allowed input from all participants in the identification of potential environmental and social hazards associated with the Project activities. In addition, possible alternatives and options could be evaluated. The process considered each activity that will, or may, occur during the Project including:

- Planned routine activities
- Planned but non-routine activities
- Unplanned or accidental activities.

It is important to note that existing mitigation measures designed into the Project were considered during these discussions.

Detailed risk assessments have been conducted for proximity of the SCPX pipeline to other pipelines, and to areas of population and for the location of equipment at the facilities. These are discussed in Chapter 12 (Hazard Analysis and Risk Assessment).

Risk is an expression of the likelihood that an event will occur and the magnitude of the potential consequences if it does occur. Within Chapter 12 risks have been assessed without mitigations within the Project design or operating procedures and after the application of mitigation measures to determine the residual risk.

The relevant tables from this chapter have been used to assess the impacts. The impacts on community health and safety and the probability of the event occurring have been assessed using the HIA methodology outlined earlier in this chapter. The residual risk has been evaluated based on the residual impact significance and event probability in accordance with the matrix presented in Figure 3-4.

	Probability							
Impact Significance/Severity	1	2	3	4	5	6	7	8
Very High	L	H	H	H	H	H	H	H
High	L	L	M	M	M	H	H	H
Medium	L	L	L	M	M	M	M	M
Low	L	L	L	L	L	M	M	M
Very Low	L	L	L	L	L	L	M	M
Overall significance: H = High, M = Medium, L = Low								

Figure 3-4: Residual Risk Significance Matrix for Unplanned Events

3.11 Cumulative and Transboundary Impacts

Cumulative and transboundary impacts resulting from the SCPX Project have been assessed in Chapter 11.

The cumulative impact assessment identifies those environmental and/or socio-economic aspects that may not constitute a significant impact on their own, but when combined with impacts from past, present or reasonably foreseeable future activities associated with this and/or other projects may result in a larger and more significant impact(s). Examples of such impacts include:

- The recurring loss of habitat in areas that are disturbed and re-disturbed over an extended period
- Additional emissions as a number of projects are developed at the same time or a processing plant or pump station is expanded over a period of time
- The ongoing development of employment opportunities and enhancement of a local labour skills base as successive projects (related or unrelated) come on stream (for example SCP, BTC and WREP projects in Georgia).

Cumulative impacts considered in this ESIA relate to impacts due to the SCPX Project and its interaction with:

- Oil and gas pipelines:
  - BTC and WREP oil pipelines
  - SCP gas pipeline
- Industrial facilities
  - Gardabani gas-fired power stations
  - Rustavi Azot chemical plant
  - Rustavi metallurgical plant steel mill
  - Rustavi Heidelberg Georgia cement plant
  - Marneuli food factory
- Road and railway developments
  - Millennium Road
  - Transport of oil by rail from Azerbaijan via Rustavi and Tbilisi.

Proposed or ongoing developments that could also affect the SCPX Project area include:

- Energotrans's Vardzia HT power transmission line from Gardabani to Zestaphoni
- Kars–Tbilisi–Baku railway project from Azerbaijan to Turkey via Rustavi and Tbilisi in Georgia
- Tbilisi Bypass Railway Project
- The Tbilisi-Rustavi Highway Project
- Samtskhe-Javakheti Highway Upgrade Projects
- Poti Port Expansion Project
- WREP Sectional Replacement Project.

Transboundary impacts (i.e. impacts that cross the border of Georgia into neighbouring countries) are also considered during the ESIA process. In the context of the proposed SCPX Project, the potential transboundary impacts relate to an oil spill from construction plant refuelling operations reaching the Mtkvari River and being transported downstream across the border to Azerbaijan and the emissions of greenhouse gases from the operation of the SCPX facilities and pipeline. These impacts are assessed in Chapter 11 (Cumulative and Transboundary Impacts).

The 1991 Espoo Convention on 'Environmental Impact Assessment in a Transboundary Context' sets out a process by which countries that are party to the convention inform each other of projects that can have transboundary impacts. This ESIA meets Espoo's specification for the contents of an environmental impact assessment, but the Espoo Convention does not prescribe a particular assessment methodology. The Republic of Georgia is not part of the Espoo convention.

The impact significance of unplanned emissions is assessed in Chapter 12.

3.12 ESIA Disclosure and Regulatory Approval Process

The draft final ESIA will be submitted to the Ministry of Economy and Sustainable Development (MoESD) and the Georgian Oil and Gas Corporation (the official approver as per the HGA). The Ministry of Environment Protection (MoE) will carry out the expert review

and approval (state ecological examination) of this ESIA, in accordance with Georgian national procedures (as outlined in detail in Chapter 6, Section 6.5).

This draft of the ESIA document has been prepared in response to comments made during public disclosure. The report has been widely disseminated and made available for comment for a period of 60 days. Public meetings were held 50–60 days after advertisement of the application. Following the disclosure period and public meetings, all comments received have been considered and incorporated as appropriate into the ESIA before formal submission of the final ESIA to the MoESD for approval. Conclusion of the state ecological examination is issued within 20 days of receipt of the final report.

Approval of the ESIA will enable the Project to proceed based on the concepts, strategies and commitments that are contained in this document. During the review process, new commitments or modifications to those presented in this ESIA may arise to satisfy the needs and opinions of the reviewing authority. These will be incorporated into the commitments register (Appendix E) and the environmental and social management and monitoring plan (ESMMP, Appendix D).

The approval document from the MoE acts as a permit for the various planned operations that are documented and which will remain effective throughout the entire Project.

It should be noted that the high level of interface between the basic/detailed engineering and ESIA programmes has led to the situation where this ESIA Report now describes and assesses a near defined Project design for the permanent facilities and the pipeline route. As the Project progress to the completion of detailed engineering, refinements to the Project are likely to be made which may include potential route modifications. Comparable assessment techniques to those described within this document will be applied as part of a management of change process, before any changes are approved.

If, for technical or other reasons, changes are required in the Project description that may significantly alter the impacts arising from the Project, these will be conveyed to the MoE; the environmental and social implications will be assessed and documented in an environmental and social assessment and any additional mitigation measures agreed with the MoE.

3.13 Management and Monitoring

Critical to the successful implementation of the commitments and mitigation measures within this ESIA is the development of a commitments register. The construction phase commitments are then tracked through to environmental and social management plans (ESMMP), which will form the environmental and social management system (ESMS) in the construction phase. The ESMMP will also be included in the Invitation to Tender (ITT) for the construction contractor(s), and implementation of the management plans it contains will become contractually binding.

Following the SCPX Project, the operations phase commitments will be incorporated into the existing Operating Management System (OMS), which will include an integrated ESMS for SCP and SCPX.

The management and monitoring strategies to be implemented during construction and operation of the Project are described in Chapter 13 (Management and Monitoring). This chapter also identifies roles and responsibilities for implementation of the management plans in the ESMMP and for ensuring that auditing and monitoring is undertaken, results are analysed and any necessary amendments to practices are identified and implemented in a timely manner.

Monitoring during the construction and operational phases of the Project, through the audit of impact predictions and mitigation measures, will assure:

- Mitigation measures are implemented effectively
- Mitigation measures are appropriate and, if not, that they are amended or additional measures are designed and implemented
- Compliance with Project standards, guidelines and best practice as applicable
- Assessment of cumulative and residual impacts, so that appropriate measures can be designed if necessary
- The continuation of the ESIA as an iterative process through to the construction and operational E&S management systems, which will be based on continual improvement.

3.14 Difficulties Encountered

The high level of interface between the basic/detailed engineering and ESIA programmes means that this ESIA report now describes a well-defined Project design for the permanent facilities and the pipeline route. To the extent possible, the ESIA used information from the Project's design engineering teams as a basis for identifying and assessing the potential impacts. However, in some instances the ESIA identifies locations where additional pre-construction surveys will be needed to acquire site-specific data. If necessary, the management and mitigation measures proposed in this ESIA would be revised in response to new findings.

The accuracy of impact prediction can be affected by inherent uncertainties in the prediction technique used and by uncertainty concerning site-specific baseline conditions. Where mathematical modelling tools are used to predict the scale of impacts, they are often sensitive to assumptions about variable input parameters such as weather conditions. Wherever there was uncertainty, the more stringent significance criteria or conservative assumptions were applied to ensure that mitigation would be effective in reducing the significance of the impact.

ESIA is a process that generally runs in parallel with concept selection and the early stage of design, interacting with the design team to obtain data that allow potential impacts to be identified and addressed by proposed mitigation measures. Whereas the ESIA document is compiled and submitted at a certain time, refinements will continue to be made to the Project as it progresses through the detailed engineering stage. To the extent that impact prediction follows design, a Project of the scale and complexity of SCPX inevitably leaves issues that still have to be resolved and assessed after the ESIA report has been submitted. These issues could include:

- Potential route modifications
- The precise locations of temporary access roads
- The exact types and volumes of wastes to be generated
- Construction traffic flow rates and its routes to and from working areas.

Before any changes to the design described in this ESIA are approved, comparable assessment techniques to those described within this document will be applied to assess their environmental and social significance as part of a management of change process. Some of the mitigation measures in the ESIA (see Chapter 10) and the commitments included in the Commitments Register (see Appendix E) are generic in nature and are likely to apply as mitigations to late changes in the Project design. These generic mitigation measures are described in detail in the management plans within the ESMMP.

For environmental and social issues to be managed effectively the appointed construction contractors must include the generic and site-specific mitigation measures ("the commitments") in their management and monitoring plans, and take account of these issues in their method statements.

Regardless of this cautious approach taken in the ESIA process, uncertainty remains. A key element of the overall management approach is that the effectiveness of mitigation measures will be monitored, and activities will be audited. Corrective actions will be implemented in cases where mitigation fails to achieve its objectives and unacceptably high impacts occur.

All of the activities described in this ESIA are subject to obtaining the necessary regulatory approvals and environmental permits.