Chapter 10 Environmental and Social Impacts and Mitigations (Planned Activities)
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10 ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION (PLANNED ACTIVITIES)

10.1 Introduction

This chapter identifies the impacts associated with the Project design updates identified in Chapter 1 (Introduction) and described in more detail in Chapter 5 (Project Description). Briefly, these comprise:

- A reduction of the diameter of the SCPX pipeline from 56” to 48”
- The addition of a further 34km of pipeline between SCP KP 23-57 (SCPX KP 0-34)
- The relocation of the pigging station to the start of the proposed additional section of pipeline at SCP KP23 (SCPX KP0)
- Other changes associated with the above, such as a decrease in the number of journeys required for pipe transport and revisions to Project water, waste and emission estimates.

This chapter also presents the mitigation measures proposed with the aim of avoiding or minimising potential impacts, or enhancing potential beneficial effects of the proposed Project design updates and assesses the likely significance of the changes, applying the methodology that is presented in Chapter 3. The chapter focuses on the location-specific sensitivities identified in Chapters 7 and 8, potential impacts on these sensitivities and any other changes to impact significance or mitigation generated by the changes discussed in Chapter 5.

This chapter should be read in conjunction with Chapter 10 of the SCPX Final ESIA which describes the generic impacts and mitigation measures of the SCPX Project as these generic impacts and mitigations apply, with a few exceptions, to the Project design updates discussed in this Addendum. To avoid repetition, therefore, they have not been restated in full in this Addendum; however, a summary has been provided with cross-references provided to the appropriate sections of the SCPX Final ESIA. Reference should be made to Appendix E of the SCPX Final ESIA for the definitive wording of these mitigation measures.

Any changes to generic impacts or mitigation measures are clearly explained in this Addendum.

This chapter does not describe or assess unplanned and accidental events which may occur during the operational phase (e.g. pipeline rupture), which are discussed in Chapter 12, (Hazard Analysis and Risk Assessment).

10.1.1 Activity, Aspect, Impact and Mitigation Tables

The activities, aspects, likely impacts, proposed mitigation measures and residual impacts likely to be associated with the proposed SCPX Project were presented in three tables in Appendix B of the SCPX Final ESIA. These tables and the approach adopted for this Addendum are as follows:

- Table B-1 presented a matrix of activities and environmental, social and cultural heritage issues potentially associated with the proposed SCPX Project. This table has not altered since preparation of the SCPX Final ESIA and therefore has not been included in this Addendum
- Table B-2 presented likely generic potential Project impacts and proposed mitigation measures, scoring the likely significance of the potential impacts (as High, Medium or Low Adverse, or Beneficial) using the tables in Chapter 3 that take
account of the sensitivity of the receptor and the magnitude of the potential impact. This table remains largely the same as that presented in the SCPX Final ESIA. However, some items are not relevant to the proposed Project design updates. Where this is the case, the relevant commitment has been shaded in grey to highlight that this impact is not applicable to the Project design updates. The amended Table B-2 is included in Appendix B of this Addendum.

- Table B-3 presented potential location-specific impacts. A new version of Table B-3 has been created for the proposed Project design updates and is included in Appendix B of this Addendum. Readers should refer to Table B-3 in Appendix B of the SCPX Final ESIA for location-specific impacts for the remainder of the SCPX. The potential location-specific impacts (i.e. those impacts relating to places where the baseline surveys outlined in Chapters 7 and 8 noted particular environmental, social or cultural heritage sensitivity) are scored, mitigation measures are proposed and the residual impacts are scored in the same way as Table B-2.

Sections 10.2 to 10.16 discuss the potential for environmental and social impacts from activities associated with the Project design updates on various environmental and social components. These sections follow the same format as the SCPX Final ESIA.

The numbering of mitigation measures follows the same format as that used in the SCPX Final ESIA to allow cross referencing to Tables B-2 and B-3 and to the Commitments Register presented in Appendix E, see Section 10.1.1 of the SCPX Final ESIA for details.

Figure 10-1 shows the relationship between the impact assessments, commitments register and the environment and social management and monitoring plan.

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**Figure 10-1: Schematic Showing Relationship between Impact Assessment and Commitments Register**
10.1.2 Commitments Register
The Commitments Register (Appendix E) sets out the specific mitigation measures that the Project currently proposes to adopt in relation to potential impacts identified for the proposed Project design updates. This is intended to supplement the Commitments Register contained in the SCPX Final ESIA. In addition, where the wording of previous commitments has been changed to reflect the design updates, the revised wording is included in the Commitments Register. Commitments within the SCPX Final ESIA that reference the “56” pipeline” have not been updated in this addendum as, unless specifically referenced, they will apply to the 48” pipeline also.

10.1.3 Monitoring and Management
The Project has produced an Environmental and Social Management and Monitoring Plan (ESMMP) for the SCPX Project as a whole which was presented in Appendix D of the SCPX Final ESIA. It is the primary mechanism for implementing the measures listed in the Commitments Register during construction. The ESMMP in the SCPX Final ESIA will be applied equally to the Project design updates.

However, some additions and amendments are needed to the ESMMP to address particular features or impacts associated with the design updates. The amendments needed to the ESMMP are listed in Appendix D of this document.

For more information on the ESMMP, the associated contractor ESMS and the operational management and monitoring plans that will be developed for the SCPX Project as a whole, including the Project design updates please refer to Section 10.1.3 of the SCPX Final ESIA.

10.1.4 Constraints Maps
Appendix A presents maps that show physical, biological, cultural heritage and social constraints for the proposed additional section of pipeline. The maps illustrate the environmental and social baseline descriptions in Chapters 7 and 8, showing the places where location-specific sensitivities referred to in Table B-3 may occur. They may also facilitate comprehension of this chapter and the maps should be referred to when reading this chapter.

10.1.5 Discussion of Impacts and Mitigation Measures
The following sections consider the environmental and social characteristics and sensitivities of the Project design updates in the order that they were discussed in Chapters 7 and 8, and discuss the ways in which they could be impacted as a result of (a) construction, commissioning and operation of the Project design updates.

Mitigation of potential impacts has been an integral part of the conceptual design work carried out for the Project design updates and associated additional works including site, route, process and equipment selection. This is described in Chapter 4.

The mitigation measures incorporated into the engineering design process for the SCPX Project as a whole were described in detail in Chapter 5 of the SCPX Final ESIA, which should be referred to for this information. Changes to these as a result of the Project design updates are included in Chapter 5 of this Addendum.

10.1.5.1 Secondary and indirect impacts
As introduced in Chapter 3, secondary impacts are caused when the primary impact of a project leads to other secondary impacts on the environment. Indirect impacts are impacts that result from other activities that are encouraged to happen as a consequence of a project but that are not directly caused by the project (e.g. a new business is created to cater for the needs of drivers owing to increased traffic on roads caused by the Project). Please refer to Section 10.1.5.1 of the SCPX Final ESIA for further information and examples.
To verify that all secondary impacts have also been identified within this ESIA Addendum and that appropriate mitigation measures are in place, the potential interactions between each environmental and social topic areas from Chapter 10 have been evaluated. The evaluation demonstrated that all secondary impacts had been addressed through mitigation of the primary impacts.

10.1.5.2 Cumulative impacts

This chapter considers the potential cumulative (or additive) impacts of the proposed additional section of pipeline with existing developments such as the BTC/SCP and WREP pipelines, since they are part of the existing baseline environment.

The cumulative impacts considered in Chapter 11 (Cumulative and Transboundary Impacts) are those cumulative impacts that may result from the combined or incremental effects of future activities (i.e. those developments currently in planning and not included as part of the baseline) and the Project design updates.

The interaction of individual impacts of the Project design updates and associated additional works (in-combination impacts) is also discussed in Chapter 11. With any development, there is the potential for two or more environmental or social topic areas associated with the Project to impact on a given receptor or resource. For example, a sensitive receptor being affected by both noise and dust during construction could potentially experience a combined effect greater than the individual impacts in isolation. These are known as ‘in-combination’ impacts.

10.1.5.3 Consultation

During the process of preparation of this Addendum attention was paid to stakeholder concerns as expressed during the series of consultation meetings held on the proposed Project design updates and associated additional works (refer to Chapter 9).

In addition, during consultation on the SCPX Final ESIA certain impact mitigation commitments were devised in response to stakeholder comments. These apply equally to the proposed additional section of pipeline. Examples of mitigation commitments designed to deal specifically with stakeholder concerns were given in Chapter 10, Section 10.1.5 of the SCPX Final ESIA and will apply equally to the additional sections of pipeline. In addition, the Guide to Land Acquisition and Compensation has been reviewed and updated as necessary to cover the additional sections of pipeline.

10.1.5.4 Decommissioning

The HGA requires that, within 30 days of termination of the HGA a plan must be prepared describing how abandonment will be achieved. Procedures for, and commitments regarding abandonment, are described in Section 10.1.5.4 of the SCPX Final ESIA and will be applied equally to the proposed Project design updates. For further detail, please also refer to the relevant provisions of the HGA.

10.1.6 Management of Change that Occurs Subsequent to the Preparation of this ESIA Addendum

There remains a possibility that changes to the Project will occur subsequent to preparation and submission of this ESIA Addendum. If this occurs, management of change procedures will include environmental and social assessment before any changes that may have detrimental effects on environmental or social receptors are adopted (39-04). These management of change measures are described in detail in the SCPX Final ESIA, in particular commitments 39-01, 39-02, 39-03 and OP19.
10.2 Geology and Geomorphology

This section discusses potential impacts on geology and geomorphology (including topography) during construction, commissioning and operation of the proposed Project design updates and associated mitigation measures to be adopted.

10.2.1 Aspects of the Project Design Updates that Could Affect Geology or Geomorphology

The following planned Project activities could affect geology and geomorphology in the Project area:

- Re-profiling the narrow ridge used by the pipeline to cross the mud volcano ridge between SCPX KP3.5 and KP4.7 to form a safe, flat working area suitable for construction of the pipeline
- Aggregate extraction (for access road construction, sub-base material and supplying pipeline padding material).

No blasting is expected to be necessary during construction of the proposed additional section of pipeline or pigging station. The operational phase is not expected to impact on geology and geomorphology.

The area of the additional section of pipeline does not contain any significant reserves of aggregate so it is unlikely that aggregate for pipeline construction will be sourced locally, although this cannot be ruled out entirely. However, aggregate will be needed for construction purposes for the additional section of pipeline, as for the SCPX Project as a whole, for example for the construction or upgrading of access roads and construction of permanent buildings and hard standing at the pigging station and aggregate will be consumed in concrete batching plants providing concrete to the Project.

The additional section of the pipeline crosses three faults – the implications of this and the design mitigation measures to be applied are discussed in Chapter 12.

10.2.2 Key Sensitivities

The majority of the proposed Project design updates passes through soft and unconsolidated sediment that can be sensitive to erosion; potential impacts are discussed in Section 10.3.3.

Azerbaijan experiences relatively frequent earthquakes; the proposed additional section of pipeline is routed through an area that has a generally low to medium low risk of seismic activity. The additional section of pipeline route crosses three seismically active faults at approximately SCPX KP1, 27 and 28.

The pipeline route crosses an area of active mud volcanoes (SCPX KP0-6. This area is associated with potential geohazards (extrusion, subsidence and displacement) as well as increased potential for erosion.

Within the overall mud volcano area, the pipeline is routed along a narrow steep sided ridge, that is particularly prone to erosion (as detailed in Section 10.3.2) and that will need to be re-profiled to enable pipeline construction.

10.2.3 Impacts on Geology and Geomorphology

10.2.3.1 Proposed pipeline construction and commissioning, including pigging station

Impacts on geomorphology associated with construction along the ridge in the mud volcano area are discussed in Section 10.4, Landscape and Visual Impacts; erosion issues associated with construction within the mud volcano area are discussed in Section 10.3,
Soils and Ground Conditions; the risk of seismic activity is addressed in Chapter 12, Hazard Analysis and Risk Assessment. None of these issues is therefore addressed in this section.

As noted above, aggregate is unlikely to be sourced from the area local to the additional section of pipeline. However, it is estimated that approximately 65,000m³ of aggregates will be needed during construction of the entire SCPX project, including the additional section and the pigging station at KP0. The aggregate will be obtained from existing or new licensed quarries and/or borrow pits. Extraction and use of aggregates constitutes depletion of non-renewable natural resources, which is a primary impact, although the impact is expected to be small in magnitude for this Project. The generic impacts of extraction are discussed further in Section 10.2.3.1 of the SCPX Final ESIA.

10.2.3.2 Pipeline operation

The additional pipeline and pigging station are within a seismically active area and may be affected during operations by earthquakes in the region or activity in the mud volcano area, see Chapter 12, Section 12.2.5.

10.2.3.3 Impact summary and assessment of significance

Table 10-1 provides an assessment of the likely significance of impacts on geology and geomorphology before and after implementation of the proposed mitigation measures that are discussed in the following section.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Potential Impacts</th>
<th>Potential Impact Significance*</th>
<th>Mitigation</th>
<th>Residual Impact Significance*</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Use of raw materials and natural resources</td>
<td>Depletion of natural resources e.g. aggregates</td>
<td>B3 Low</td>
<td>B3 Low</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dust, noise, landscape, traffic, visual, surface water, livelihood and ecological impacts from borrow pits and spoil disposal sites</td>
<td>B4 Medium</td>
<td>B2 Low</td>
</tr>
</tbody>
</table>

* assessed using Tables 3-3 and 3-4

10.2.3.4 Mitigation of impacts on geology and geomorphology

The general mitigation measures described in Section 10.2.3.4 and listed in Appendix E of the SCPX Final ESIA will be applied to the proposed Project design updates. They are therefore not repeated here to avoid repetition. With regards impacts on geology and geomorphology, no new commitments, or amends to existing commitments, have been made as a result of the Project design updates in addition to those listed in Section 10.2.3.4 of the SCPX Final ESIA.

10.2.4 Residual Impacts

With the implementation of the proposed mitigation measures, it is considered that the residual impacts associated with aggregate use for the proposed Project design updates will be of low significance.
10.3 Soils and Ground Conditions

This section discusses potential impacts on soils during construction of the proposed Project design updates and associated mitigation measures to be adopted. The section will also consider the need to address some aspects of the baseline ground conditions, where it has the potential to affect construction activities of the SCPX project.

10.3.1 Aspects of the Project design updates that Could Affect Soils and Ground Conditions

The following activities, that may affect soil and ground conditions during construction of the SCPX Project as a whole, will also be associated with the Project design updates:

- Disturbance and removal of soil during ROW clearance, widening of access roads and creation of new access roads
- Removal of soil and civil engineering works at the pigging station
- Storage of topsoil and subsoil for re-use in backfilling and reinstatement
- Heavy plant and equipment on ROW (during construction and for inspection and maintenance during the operational phase)
- Use of the ROW as a vehicle running track to provide access to the works
- Accidental release of potential contaminants (e.g. fuel, hazardous waste, chemicals)
- Disposal of surplus subsoil and aggregate.

During the operational phase driving along the ROW may also cause compaction and erosion. However, BTC/SCP operations staff are only allowed to drive along the ROW in an emergency. Small quantities of domestic sewage, wastewater and surface water run-off may be generated at the pigging station.

The above activities may cause adverse impacts in terms of:

- Soil compaction
- Altered soil properties (structure, fertility, aeration status)
- Erosion and soil loss
- Ground settlement
- Mobilisation of pre-existing contaminants
- Soil contamination
- Backfilling of the excavated trench.

10.3.2 Key Sensitivities

10.3.2.1 Soil

- Many of the soils encountered exhibit high levels of salinity, which can contribute to accelerated corrosion of both steel and concrete
- Overhead electrical transmission lines can increase corrosion potential at crossings
- The presence of gypsum in soils may lead to an increased risk of corrosion of steel and concrete
- The texture of the soils along the majority of the proposed additional section of pipeline is very small, primarily fine silts and clays, which are considered more prone to erosion. Three areas in particular (KP0.5-6, KP22.5-KP24, KP27-27.5) are assessed as having a high erosion potential
- The area of the mud volcanos, including the mud volcano ridge, (SCPX KP3.5-4.7) is particularly prone to erosion
• Topsoil depth is very thin (less than 5cm) in some places along the route. There is little or no topsoil on the mud volcano ridge (SCPX KP3.5-4.7)
• The small particle size of the soils means they are more prone to compaction, have poor traffic-ability when wet and are prone to dust generation during dry conditions
• Silt generation and incorporation into surface water flow (Pirsaat River (SCPX KP18.2), various small streams and small irrigation canals).

10.3.2.2 Contamination
• The identified contamination was low levels of municipal waste and fragments of cement sheet which potentially contains asbestos
• The majority of contamination identified appeared to be the result of ongoing fly-tipping by third parties. Therefore, it is likely to be an ongoing issue regardless of any remediation efforts
• Suspected waste cuttings and drilling muds identified at KP32 are associated with third party historic drilling in the area. The extent of contamination of drilling mud is not known
• There may be a health and safety risk to workers and the local population during both construction and operation. The risk to construction workers is likely to be greatest owing to the potential for actively disturbing any contamination (e.g. asbestos cement). It should be noted that the effects of contamination on workers is outside the scope of this ESIA
• Pre-existing contamination along the proposed pipeline route being incorrectly attributed to SCPX construction activities or subsequent operations.

10.3.3 Impacts on Soils and Ground Conditions

10.3.3.1 Proposed pipeline construction and commissioning, including pigging station
The potential impacts of the proposed Project design updates are generally the same as those for the SCPX Project as a whole. These are described below, along with any particular impacts associated with the additional section of pipeline, due to the sensitivities described in Section 10.3.2. The impacts of silt run-off to watercourses are discussed in Section 10.5, Surface Water Resources.

Compaction
The impacts of soil compaction caused by construction of the additional sections of pipeline will be similar to that described in the equivalent section of the SCPX Final ESIA; namely that it alters drainage characteristics; reduces aeration levels, which may cause anaerobic or waterlogged conditions to develop; and may cause surface run-off and localised flooding. Compaction can also have secondary impacts on ecology, as it reduces the ability of vegetation to re-establish (see Section 10.7.3) and on agricultural productivity and associated livelihoods (see Section 10.13.3).

Soil properties
In common with much of the SCPX route, the depth of topsoil in some areas of the additional section of pipeline is low (less than 5cm), particularly in the area of the mud volcanoes, including the mud volcano ridge (KP3.5-4.7). In these areas, stripping of topsoil and segregation of topsoil and subsoil will be more difficult. However, topsoil depth generally increases as the ROW progresses further westwards. Exact topsoil depth along the ROW will be confirmed by a pre-construction survey.

Other potential impacts of construction of the additional sections of pipeline (soil disturbance leading to changes to soil structure, nutrient content, loss of fertility and a loss in viability of the soil seed bank) will be similar to that described in the equivalent section of the SCPX Final ESIA which should be referred to for this information.
**Erosion and soil loss**
Preparation of the ROW, including removal of vegetation, topsoil stripping and benching, will disturb soil structure and stability. This may increase the risk of erosion, particularly in areas where soils have poor cohesion or are steeply sloping, in particular at the mud volcano ridge (SCPX KP3.5-4.7). The erosion risk is expected to be highest during wet weather, when tunnels may develop, and will be exacerbated by vehicle movements.

A baseline assessment of the erosion class of the soil along the proposed additional section of pipeline has been undertaken and results presented in Chapter 7. Erosion classes from 1 to 7 have been defined with an erosion class of 4 classed as high (see Table 7-2). Erosion classification of the soils along the proposed additional section of pipeline has been provided in Table 7-3. Locations with the highest erosion risk are listed as sensitivities in Section 10.3.2.

Construction of the proposed pigging station will necessitate the excavation of topsoil and subsoil. As a result of Project design updates the footprint of the pigging station has been reduced from 3200m$^2$ in the SCPX Final ESIA to 2,432m$^2$ (this is the area enclosed within the proposed security fence). Soils will be reused locally and will therefore be permanently lost from their point of origin.

Other potential impacts of construction of the additional sections of pipeline (soil stability at areas exhibiting active erosion, topsoil movement and storage and secondary impacts) will be similar to that described in the equivalent section of the SCPX Final ESIA which should be referred to for this information.

**Flooding**
The impacts on flooding caused by construction of the additional sections of pipeline will be similar to that described in the equivalent section of the SCPX Final ESIA; namely that the occurrence of natural floods, not related to Project activities, has the potential to cause immediate soil erosion and soil loss and can entrain contaminants, which in turn lead to longer-term loss of soil fertility and potential secondary impacts on vegetation recovery and the use of the land for agriculture.

**Disposal of surplus subsoil and aggregate**
If subsoil is not properly spread beneath the topsoil, and if any aggregate is not removed following construction, there could be adverse impacts on soil structure, fertility and the seed bank with consequent effects on vegetation recovery and agricultural productivity. Off-site disposal at approved borrow pits and spoil pits of aggregate and surplus sub-soil that cannot be re-spread within the ROW can result in negative impacts on soil structure, fertility and seed bank of the receiving site if not planned properly.

**Land contamination**
Contaminated land impacts are addressed in this section in terms of:

- Undertaking construction in land that is contaminated
- Accidental contamination of land during pipeline construction or removal from service activities.

**Pre-existing land contamination**
Five areas of contamination, comprising three areas of fly-tipped waste, one area of cement tile fragments potentially containing asbestos and one area of suspected waste cuttings and drill muds, were identified along the ROW of the proposed additional section of pipeline, as detailed in Section 7.3. The impacts of encountering contaminated soils during construction could be two-fold:

- Risk to health and safety of construction personnel (which is outside the scope of this ESIA)
• Risk of mobilising contaminants into the wider environment.

There is also a risk that areas of as yet unidentified contamination may be encountered during construction of the pipeline and pigging station, particularly in the following areas:

• Where the proposed SCPX ROW crosses existing oil pipelines, which may have had underground leaks
• Where the proposed pipeline route crosses watercourses (in the case of the additional section of pipeline, the Pirsaat river) where contaminants (particularly heavy metals) may have accumulated in riverbed sediments
• Areas of potential (but as yet undiscovered) UXO along the pipeline ROW and access roads
• Areas where anthrax-infected livestock may have been buried.

When contaminated land is disturbed, contaminants may be mobilised into the wider environment and could cause contamination of previously clean groundwater or surface water resources with possible secondary impacts on the users of that water and on flora and fauna.

Contamination during construction
The impacts on contamination caused by construction of the additional sections of pipeline will be similar to that described in the equivalent section of the SCPX Final ESIA; namely that soils, surface or ground water may become contaminated by fuel, oil and chemicals hazardous waste and sewage.

Contamination of surface waters by sediments running off construction areas is addressed in Section 10.5.

Secondary impacts from contamination of soils (and ground and surface water) include the following:

• Impacts on terrestrial flora and fauna causing mortality or reduction in breeding
• Leaching from soils to watercourses causing impacts to macrofauna and fish
• Reduction in crop yield leading to loss of livelihood
• Livestock mortality leading to loss of livelihood
• Health impacts, including contamination of drinking water.

These impacts are discussed further in Sections 10.7.3, 10.12.3 and 10.13.3.

10.3.3.2 Pipeline operation
When the SCPX pipeline is operating, regular horseback patrols of the pipeline ROW including the proposed additional section of pipeline, will be undertaken by SCPX. Security patrols will also be undertaken by the Azerbaijan Government Export Pipelines Protection Department (EPPD). Driving along the ROW by BTC and SCP operations staff is not permitted except in an emergency.

The pigging station may need to dispose of small quantities of domestic sewage and wastewater, with potential impacts on soils if discharged to land. Very small quantities of domestic waste may be generated and very small quantities of chemicals (domestic cleaning chemicals) may be used. There will also be some surface water run-off from concreted areas on the sites.

10.3.3.3 Impact summary and assessment of significance
The significance of the generic impacts of the additional sections of pipeline and the additional works proposed have been reviewed and are assessed to be similar to those for
the rest of the SCPX pipeline in Azerbaijan. Please therefore refer to Table 10-4 of the SCPX Final ESIA for this information.

Table 10-2 below provides an assessment of the significance of site specific or additional impacts on soils and ground conditions as a result of the Project design updates before and after implementation of the proposed mitigation measures that are discussed in the following section.

**Table 10-2: Soil Impact Assessment at Sensitive Locations and/or Receptors**

<table>
<thead>
<tr>
<th>Location</th>
<th>Issue</th>
<th>Potential Impacts</th>
<th>Potential Impact Significance*</th>
<th>Mitigation</th>
<th>Residual Impact Significance*</th>
</tr>
</thead>
<tbody>
<tr>
<td>KP0-KP6 (excluding mud volcano ridge between KP3.5-4.7)</td>
<td>Thin topsoil layer</td>
<td>Risk of loss of topsoil as a result of topsoil stripping, handling, storage and re-instatement operations, leading to slow and/or impaired re-vegetation post construction</td>
<td>B or C4 Medium</td>
<td>X3-02, 4-15</td>
<td>B or C2 Low</td>
</tr>
<tr>
<td>KP0.5-6 (excluding mud volcano ridge between KP3.5-4.7), KP22.5-KP24, KP27-27.5</td>
<td>Highly erodible soils (soils with high erosion potential)</td>
<td>Increased erosion and risk of gullying</td>
<td>B or C3 Medium</td>
<td>3-03, 3-09, 3-28, 3-32, 3-15, OP136</td>
<td>B or C2 Low</td>
</tr>
<tr>
<td>KP3.5–KP4.7</td>
<td>Narrow very steep sided, highly erodible ridge (mud volcano ridge) with very thin or non-existent topsoil</td>
<td>Any topsoil in this section is unlikely to be salvageable during construction; increased erosion and risk of gullying post construction</td>
<td>A5 Medium</td>
<td>X7-25a</td>
<td>A4 Low</td>
</tr>
<tr>
<td>KP16, KP17, KP20, KP29</td>
<td>Asbestos and municipal waste contamination along the ROW</td>
<td>Health and safety of workforce and risk of mobilisation of contaminants into the wider environment</td>
<td>B3 Low</td>
<td>6-01, 6-02</td>
<td>B- Beneficial</td>
</tr>
<tr>
<td>Location</td>
<td>Issue</td>
<td>Potential Impacts</td>
<td>Potential Impact Significance*</td>
<td>Mitigation</td>
<td>Residual Impact Significance*</td>
</tr>
<tr>
<td>----------</td>
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<td>-------------------------------</td>
<td>------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>KP32</td>
<td>Suspected waste cuttings and drill muds along the ROW</td>
<td>Health and safety of workforce and risk of mobilisation of contaminants into the wider environment</td>
<td>B3 Low</td>
<td>6-01, 6-02, 6-14</td>
<td>B- Beneficial</td>
</tr>
</tbody>
</table>

* assessed using Tables 3-3 and 3-4

10.3.4 Mitigation of Impacts on Soils and Ground Conditions

The general mitigation measures described in Section 10.3.4 and listed in Appendix E of the SCPX Final ESIA will be applied to the proposed Project design updates. They are therefore not repeated in full here to avoid repetition. These mitigation measures relate to:

- Contamination surveys and remedial action and
- Topsoil storage, erosion control measures during construction, reinstatement requirements and pipeline operational monitoring.

The site-specific impacts of the proposed Project design updates will be addressed using the commitments listed in Table 10-2 above. These are also commitments that were developed for the SCPX Final ESIA, and reference should therefore also be made to Section 10.3.4 of the SCPX Final ESIA and Appendix E of the SCPX Final ESIA for this information.

10.3.5 Residual Impacts

With the implementation of the mitigation measures outlined above, the residual impacts on soil of the proposed Project design updates can be summarised as follows:

- Residual impacts on the viability of the soil and seed bank are predicted to reduce from medium to low significance by implementation of the proposed mitigation measures
- Soil compaction will be relieved by the proposed mitigation measures. The residual impact is considered to be of low significance
- Similarly, residual impacts on soil properties are considered to be of low significance
- Topsoil management will reduce the impact on the viability of the soil and seed bank to low significance
- Implementation of the proposed mitigation measures is expected to reduce residual impacts associated with soil erosion from high to low significance. Soil loss will be monitored and corrective actions taken if it exceeds erosion class 3
- In respect of the disposal of surplus subsoil and aggregate, implementation of the mitigation measures proposed is predicted to result in a low residual impact only
- Residual impacts of flooding on soil erosion, soil loss and soil fertility is expected to reduce from low–medium to low as a result of the mitigation measures described
- Residual impacts of the construction activities on existing, known contaminated land are considered to be beneficial to the extent that it is cleared; for contaminated land discovered during construction, residual impacts are of low significance and also beneficial to the extent that it is cleared
• The impact of waste management and storage of chemicals and fuels on soil contamination is expected to be low with the mitigation measures proposed
• If a spill occurs, the potential impact will depend on the type and amount of the chemical or fuel that has been spilled and the sensitivity of receiving environment. The residual impact on soils is generally expected to be low providing a remediation strategy is followed and considering the relatively small volumes of hazardous materials that are to be used during construction.

10.4 Landscape and Visual Impacts

This section discusses potential impacts on landscape and the views afforded to visual receptors during construction and operation phases of the proposed Project design updates and the associated mitigation measures to be adopted.

10.4.1 Aspects of the Project Design Updates that Could Affect Landscape and Views

The following planned construction activities could affect landscape character and views from receptors:

• Vegetation clearance from the ROW
• Temporary use of land for construction along the ROW, ROW access roads, borrow pits and spoil disposal pits
• Construction of any new temporary access roads needed in respect of access to the ROW
• Installation of hard bank reinforcement measures at the Pirsaat river crossing to prevent erosion of the cover over the pipeline
• Temporary lighting during construction at river and other major crossings where work continues overnight.

There are no significant impacts on landscape and visual impact during commissioning, with the exception that lighting may be needed overnight for short periods at the test points, for example during hydrotesting.

During operation there will be a permanent landscape and visual impact from:

• Permanent changes in topography of the proposed pipeline route where the existing landform is levelled during construction and not fully reformed during reinstatement
• The permanent presence of the proposed pigging station and the access road to the pigging station.

Activities during operation of the proposed SCPX are considered unlikely to affect landscape character or views with the potential exception of:

• The installation of hard bank reinforcement measures at the Pirsaat watercourse crossing as a result of subsequent natural erosion processes
• The permanent visual impact of the aerial and pipeline markers installed to identify the pipeline route on the ground
• Lighting at the pigging station.

10.4.2 Key Sensitivities

10.4.2.1 Landscape character

The pipeline will be buried, so landscape and visual impacts are temporary and linked to the construction and post-construction restoration phases of the pipeline.
The key issues that relate to landscape and visual receptors along the proposed pipeline route are summarised below.

The mud volcano ridge between SCPX KP0-6, but particularly between SCPX KP3.5-4.7 is of high quality / importance and sensitivity, and is particularly sensitive to long term (i.e. post-construction) effects of pipeline construction because of the natural character of the landscape, the good views from hill tops, and the potential importance of the landscape for tourism.

The pigging station is located on an elevated plain that is part of the mud volcano ridge area but which is of lower landscape importance. The small farming community of Goltug is located approximately 625 m away. They will view the pigging station, which at that distance will form a small, low element in the existing extensive southerly views from this community.

The flat desert landscape is of low quality/importance and sensitivity and once constructed the pipeline would only be visible from close to, and is unlikely to be visible from the nearby roads and settlements.

The agricultural landscape is of very low quality / importance and sensitivity and once re-instated the pipeline would probably not be apparent above-ground.

10.4.3 Landscape and Visual Impacts

10.4.3.1 Proposed pipeline construction and commissioning, including pigging station

During construction, the proposed pipeline ROW will be visible through the landscape during construction when the vegetation is removed and topsoil stripped back within the construction corridor. Once construction is complete, the pipeline will be buried and the land will be reinstated to the original land use. Generally, therefore, the construction of the pipeline is only predicted to impact on the landscape during construction and for a period afterwards determined by the time it takes the pre-existing vegetation cover and land-uses to re-establish. Arable land, which comprises approximately 20% of the proposed additional pipeline route, should return to pre-existing appearance within the next growing season following topsoil replacement, i.e. within approximately 12 months following reinstatement.

The desert and semi-desert habitats crossed are anticipated to take longer to fully recover. Landscape monitoring from a survey conducted in 2013 of the existing BTC and SCP (reported in Chapter 7, Section 7.4) shows positive recovery subsequent to reinstatement (which was carried out during 2006-2007) at all selected landscape vantage points. The progress of restoration of the eastern section of the SCP route from KP0–KP147 (equivalent to SCPX KP0-KP124) is slower, with many locations being less than 50% restored to original value. This is mainly linked to the shallow topsoil depths and susceptibility of the soils in these areas to compaction, as discussed further in Section 10.3.2.1 and Section 10.7.2.

The proposed SCPX pipeline is routed as close as practicable, and parallel to, the SCP and BTC pipelines for most of its length. In general, the pipeline is routed a minimum of 20m from the existing pipelines (see Chapter 5, Section 5.4.7 of the SCPX Final ESIA) and therefore shares some of its working area and ROW with the existing pipelines. This has the advantage of minimising overall landscape impacts but there is the potential for cumulative impacts on the area that is disturbed again during SCPX construction. These cumulative impacts are considered most likely to occur in those areas that have been relatively slower to recover from BTC and SCP construction, which encompasses the whole of the proposed additional section of pipeline (KP0-57). The other areas of particular sensitivity are where the pipeline crosses steep, erodible ridges in the mud volcano ridge area (KP3.5-4.7) The SCPX pipeline has been re-routed approximately 400m away from the existing pipelines between KP3.5 to KP4.7 and 200m away from the existing pipelines between KP26 to KP28.5. There are very few field boundaries crossed by the proposed pipeline route and the
need for removal of trees at field boundaries is likely, therefore, to be very limited. In respect of views during construction, there will be views of plant and machinery and the stripped working area from nearby houses on sections of the route.

The Project will aim to prioritise the use of existing access roads, particularly those that were used for BTC and SCP construction, and it is considered that there will be minimal, if any, additional visual or landscape impact created by their use for SCPX construction. In addition, some new access roads may be needed, for example where pre-existing access tracks are no longer available. Project needs will be assessed and potential new temporary access roads identified during detailed design.

The locations of any temporary concrete batching plants that may be needed will be determined by the contractor. If any are needed, these are likely to be close to the major open-cut watercourse crossing at the Pirsaat river. These plants will only operate for, at maximum, the duration of pipeline construction and in practice probably only for several months.

The need for and locations of any dedicated borrow-pits and spoil disposal sites will be identified by the contractor.

The existing BTC and SCP pipeline crossings of the Pirsaat river are protected by hard bank rip rap reinforcement. Rip rap reinforcement is also likely to be used at the proposed SCPX crossing (KP18). Hard bank reinforcement has the potential to create secondary impacts by increasing flow velocity and therefore erosion immediately downstream of the works and to create cumulative impacts if protection is installed over both the existing BTC/SCP and SCPX crossings.

Temporary lighting will be needed during commissioning at the main hydrostatic test points. The proposed additional pipeline route crosses steep erodible ridges within the mud volcano ridge area (KP3.5-4.7). The ROW will be benched (levelled) to create a safe working area for plant and machinery and the ridges will not be fully reinstated to pre-construction contours to seek to reduce erosion. There will therefore be a permanent change to the pre-existing topography in these areas.

10.4.3.2 In the operations phase
Risks and impacts associated with operation of the additional sections of pipeline and equipment associated with the Project design updates are similar to those described in Section 10.4.3 of the SCPX Final ESIA, which should be referred to for this information.

The proposed pigging station will be located on an elevated plain that is part of the mud volcano ridge area but which is of lower landscape importance. It will comprise a fenced compound with low-level buildings. A new access road will be constructed to the site using an existing track. The pigging station will be located in a rural area, the small farming community of Goltug is located approximately 625m away. They will view the pigging station, which at that distance will form a small, low element in the existing extensive southerly views from this community. The visual and landscape impact of the site and access road are therefore predicted to be low.

10.4.3.3 Impact summary and assessment of significance
The significance of the generic impacts of the Project design updates on landscape character and views have been reviewed and are generally assessed not to have changed from those in Table 10-5 of the SCPX Final ESIA. Please refer to this table of the SCPX Final ESIA for this information.

Table 10-3 below provides an assessment of the significance of site specific landscape and visual impacts as a result of the Project design updates before and after implementation of the proposed mitigation measures that are discussed in the following section. This table includes the revised location of the pigging station.
Table 10-3: Landscape and Visual Impact Assessment at Sensitive Locations and/or Receptors

<table>
<thead>
<tr>
<th>Location</th>
<th>Issue</th>
<th>Potential impacts</th>
<th>Potential Impact Significance*</th>
<th>Mitigation</th>
<th>Residual Impact Significance*</th>
</tr>
</thead>
<tbody>
<tr>
<td>KP3.5-KP4.7</td>
<td>Narrow erodible ridges within the mud volcano ridge area</td>
<td>The visual appearance and character of the landscape will be altered permanently as the ROW will be benched (levelled) to create a safe working area for plant and machinery and the ridge will not be fully reinstated to pre-construction contours to reduce erosion</td>
<td>D4 High</td>
<td>X4-10</td>
<td>D3 Medium</td>
</tr>
</tbody>
</table>

* assessed using Tables 3-5 and 3-6

10.4.4 Mitigation of Landscape and Visual Impacts

The relevant general mitigation measures described in Section 10.4.4 and listed in Appendix E of the SCPX Final ESIA will be applied to the proposed Project design updates. They are therefore not repeated here to avoid repetition. These mitigation measures relate to activities including:

- Reinstatement of temporary areas and re-establishment of vegetation
- Landscaping and re-contouring
- Re-vegetation and bio-restoration monitoring.

The site-specific impacts of the proposed Project design updates will be addressed using the commitments listed in Table 10-3 above. These are also commitments that were developed for the SCPX Final ESIA, and reference should therefore also be made to Section 10.5.4 of the SCPX Final ESIA and Appendix E of the SCPX Final ESIA for this information. However, a minor change has been made to the following commitment to address the narrow erodible ridge in the mud volcano area through which the proposed additional section of pipeline passes:

- Following pipeline installation at specific locations determined by COMPANY, an assessment will be conducted and used to design the final landform. The aim will be to create a natural looking landform in keeping with the landscape character of the broader area, as far as practical, having due regard to the over-riding need to assure the integrity of the pipeline during operation (X4-10).

10.4.5 Residual Landscape and Visual Impacts

10.4.5.1 Proposed pipeline construction including pigging station

The pipeline will be buried and the land will be reinstated to the original land use following construction. Generally, therefore, the construction of the pipeline is only predicted to impact on the landscape during construction and for a period afterwards determined by the time it takes the pre-existing vegetation cover and land-uses to re-establish, with arable land expected to return rapidly to pre-existing appearance and desert and semi-desert habitats taking longer to fully recover. For the vast majority of the proposed additional pipeline route, the pipeline is therefore considered to have a low residual landscape and visual impact following reinstatement of the natural vegetation and pre-existing agricultural land.

However, where permanent re-contouring is carried out the impact could be medium as a permanent change is predicted in the local area and the new landform may be prominent if not significantly uncharacteristic. It may be possible to reduce the impact through
sympathetic re-contouring but a final assessment of the landscape impact will not be possible until the new landform has been designed. This is particularly the case where the pipeline crosses the narrow ridge between KP3.5 and KP4.7.

The residual visual and landscape impacts of any new temporary access roads needed to access the ROW cannot be assessed as the locations are unknown at present, but sympathetic routing will aim to achieve a low residual impact. The aim is to reinstate temporary access roads, with any deviations subject to Company approval.

The residual visual and landscape impacts of any dedicated borrow-pits established for the Project is predicted to be low.

The residual impact of disposal of surplus subsoil and aggregate and any spoil disposal sites is predicted to be low with sympathetic re-contouring.

Hard bank reinforcement will be needed where the SCPX route crosses the Pirsaat river but is predicted to create a low residual landscape and visual impact.

10.4.5.2 SCPX operation

There will be a permanent visual impact from the pigging station. The pigging station is a small compound and will not be significant in views from receptors or change the character of the landscape. The residual landscape and visual impacts from installation of the pigging station, although permanent, is therefore considered to be of low significance.

There will also be a permanent visual impact from the aerial and pipeline markers needed to identify the route. Although permanent, they are considered to have a low residual impact.

Hard bank reinforcement of the Pirsaat crossing is likely to be needed and the residual impact of this will be assessed at the time in accordance with OP19.

10.5 Surface Water Resources

This section discusses potential impacts on surface waters during construction and operation of the proposed Project design updates and associated mitigation measures to be adopted.

10.5.1 Aspects of the Project Design Updates that Could Affect Surface Water Resources

The following planned construction and commissioning activities could affect surface water receptors:

- Increased sediment run-off from the ROW after vegetation and soil stripping, until the area has re-vegetated after reinstatement
- Drainage from access roads into surface watercourses
- Discharge of storm water from the pipeline trench and excavations – this is likely to contain sediment
- Temporary abstraction of water for construction use, such as making-up the drilling mud used at non-open-cut crossings, supplying water for dust control and supplying water to any concrete batching plants established for the Project
- Accidental release of potential contaminants (e.g. fuel, hazardous waste, chemicals) during pipeline and pigging station construction
- Use of vehicles in watercourses
- Riverbank and riverbed disturbance during the construction of open-cut crossings at the Pirsaat river and installation of temporary crossings for construction plant and traffic at watercourses
• Disruption of water flows during construction of open-cut crossings at Pirsaat river
• Abstraction of river water for use as hydrotest water
• Discharge of pipeline hydrotest water into watercourses
• Discharge of treated domestic sewage and wastewater from kitchens and bathrooms at camps into watercourses.

Disruption or impedance of flow during open-cut crossings of watercourses, drainage and irrigation channels are discussed in Sections 10.7, 10.12 and 10.15.

Impedance of floodwater by topsoil storage mounds is discussed in Section 10.3.

The following activities during operation of the pipeline and facilities could impact surface water receptors:

• Disposal of surface water drainage from the pigging station
• The installation of new or additional hard bank reinforcement measures such as gabions or rip-rap at watercourses where needed by subsequent natural erosion processes.

10.5.2 Key Sensitivities

The main river to be crossed by the proposed additional section of pipeline is the Pirsaat river.

The Pirsaat has a strongly seasonal flow regime with an increased chance of flooding during spring and autumn. This in turn has implications for programming of water-crossing installations, seasonal sensitivity of watercourses to pollution, emergency response planning and the availability of, and impacts of using, river water for pipeline hydrostatic testing.

The Pirsaat has a high sediment load. Water quality of the Pirsaat shows elevated levels of contaminants that need to be considered when assessing the use of any water, and the impacts of any releases, during construction, including:

• Elevated concentrations of heavy metals in comparison to target concentrations developed following WFD guidance
• TSS above the limit for controlled waters recommended by WFD guidance
• High coliform counts.

The Pirsaat, and other minor watercourses crossed by the proposed additional section of pipeline, may be important for agriculture and industry.

10.5.3 Impacts on Surface Water Resources

There is the potential for construction of the additional section of pipeline to cause a range of impacts on the surface watercourses crossed. These impacts are briefly summarised below and are the same as those described in Section 10.5.3 of the SCPX Final ESIA which should be referred to for more information:

• Changes in water quality of the watercourses due to accidental spillages during construction
• Changes in water quality due to the release of sediment from the ROW or during construction of the watercourse crossing – the Pirsaat river will be crossed using open-cut crossing methods
• Impedance of flow affecting any downstream users.
Approximately 100,000m³ of water will be extracted from the Pirsaat river to hydrotest the most eastern section of the proposed pipeline. The impact of water abstraction is discussed in Section 10.5.3 of the SCPX Final ESIA. If the water is discharged back to the river, there is a risk this may affect the quality of the surface water as a result of the presence of hydrotest chemicals.

10.5.3.1 Impact summary and assessment of significance

The significance of the generic impacts of the proposed design updates on those surface water aspects and resources relevant to this Addendum, including abstraction and discharge of hydrostatic test water, have been reviewed and are assessed not to have changed from those in Table 10-7 of the SCPX Final ESIA, which should be referred to for this information.

Table 10-4 provides an assessment of the likely significance of site specific surface water impacts before and after implementation of the proposed mitigation measures.

### Table 10-4: Surface Water Impact Assessment at Sensitive Locations and/or Receptors

<table>
<thead>
<tr>
<th>Location</th>
<th>Issue</th>
<th>Potential Impacts</th>
<th>Potential Impact Significance*</th>
<th>Mitigation</th>
<th>Residual Impact Significance*</th>
</tr>
</thead>
<tbody>
<tr>
<td>KP18 Pirsaat river</td>
<td>Open-cut crossing of river</td>
<td>Increased bank erosion. Possible threat to pipe integrity</td>
<td>C4 Medium</td>
<td>X5-17</td>
<td>C2 Low</td>
</tr>
<tr>
<td>KP18 Pirsaat river</td>
<td>Open-cut crossing of river</td>
<td>Impeded flow of channel disrupting downstream users</td>
<td>B3 Low</td>
<td>11-01, 11-02</td>
<td>B1 Low</td>
</tr>
<tr>
<td>KP18 Pirsaat river</td>
<td>Open-cut crossing of river</td>
<td>Increased levels of sediment by open-cut crossing technique or other silty discharges</td>
<td>B2 Low</td>
<td>10-19, 10-02, 10-04</td>
<td>B1 Low</td>
</tr>
</tbody>
</table>

* assessed using Tables 3-7 and 3-8

10.5.4 Mitigation for Surface Water Impacts

The general mitigation measures described in Section 10.5.4 and listed in Appendix E of the SCPX Final ESIA will be applied to the proposed Project design updates including abstraction and discharge of hydrostatic test water from the Pirsaat river. They are therefore not repeated here to avoid repetition. These mitigation measures relate to activities including:

- Restrictions on the percentage of river flow that can be abstracted
- Application of measures including pumping or fluming to seek to ensure minimal interruption to waterflow
- Re-use of hydrotest water where practicable
- Preparation of a hydrotest plan including a risk assessment for the use of chemicals
- Sediment reduction and erosion control measures including during discharge of trench water and hydrotest water
- Control of hazardous materials
- Application of surface water quality standards, monitoring and discharge permits.
The site-specific impacts of the proposed Project design updates will be addressed using the commitments listed in Table 10-4 above. These are also commitments that were developed for the SCPX Final ESIA, and reference should therefore also be made to Section 10.5.4 of the SCPX Final ESIA and Appendix E of the SCPX Final ESIA for this information.

10.5.5 Residual Impacts on Surface Water Resources

10.5.5.1 Proposed pipeline construction including pigging station

The residual impact of soil erosion and sediment run-off on sediment levels in watercourses is predicted to be low taking into account: the suite of mitigation measures proposed to reduce and control erosion and sediment run-off from the ROW and during watercourse crossing construction; and the fact that background sediment levels in the watercourses crossed by the proposed additional section of pipeline are usually high.

The residual impact of the disposal of trench water to watercourses is predicted to be low due to the measures proposed to avoid discharge of trench water to watercourses or reduce sediment level and scour where the water needs to be discharged to rivers.

The impact of the temporary abstraction of water from the Pirsaat river for Project use is considered to be low due to the process proposed to assess impacts and limit abstraction volumes.

The residual impact of spills is predicted to be low, where the water is used for agricultural or industrial purposes and medium where the water is used for domestic or potable purposes, due to the spill prevention and clean-up measures proposed. It should be noted, however, that large-scale use of water for domestic or potable use does not occur, perhaps due to poor pre-existing water quality.

The residual impact of the disposal of hydrostatic test water is also predicted to be low due to the measures proposed in respect of chemical use, treatment of the water before discharge and measures to reduce soil erosion and scour during discharge.

Treatment of domestic sewage and waste water produced at the pigging station (by either on or off-site treatment) is designed to achieve a low residual impact.

10.5.5.2 SCPX operation

The risk to pipeline integrity of watercourse bed and bank erosion is predicted to be low due to initial watercourse crossing design, the watercourse monitoring measures proposed and maintenance of liaison with aggregate extraction companies.

The residual impact of sewage discharges from the pigging station is predicted to be low owing to the small volume involved.

The residual impact of surface water run-off is predicted to be low, as it is unlikely to be contaminated. No fuel or chemicals are proposed to be stored at the pigging station.

10.6 Groundwater Resources

This section discusses potential impacts on groundwater during construction and operation of the proposed Project design updates and associated mitigation measures to be adopted.
10.6.1 Aspects of the SCPX Project Design Updates that Could Affect Groundwater Resources

The following aspects of construction, commissioning and operation of the proposed Project design updates have the potential to affect groundwater:

- Accidental release of potential contaminants (e.g. fuel, hazardous waste, chemicals) during pipeline and pigging station construction
- Disruption or impedance of groundwater flows in shallow groundwater areas during trenching
- Possible contamination of groundwater by hydrotest chemicals (if used), or by imported test water of different quality to local ambient groundwater (due to differing salinity, redox etc.)
- Production and disposal of domestic sewage and wastewater at the pigging station
- Production and disposal of solid and liquid waste.

The following activities during operation of the pipeline could impact surface water receptors:

- Disposal of waste, waste water and surface water drainage from the pigging station
- Disruption or impedance of groundwater flows in shallow groundwater areas due to the presence of the pipeline in the ground.

10.6.2 Key Sensitivities

Key sensitivities along the proposed additional section of pipeline and pigging station location with respect to groundwater are as follows:

- Groundwater generally has a low importance and sensitivity, and is largely non-potable and unexploited. However, a possible exception to this is that there may exist small (unmapped) pockets or lenses of fresh groundwater along the route. These, if they exist, are likely to be extremely important to local herdsmen, nomads and even villagers in this arid region because fresh groundwater reserves are so scarce.

10.6.3 Impacts on Groundwater

10.6.3.1 Proposed pipeline construction and commissioning, including pigging station

Groundwater quality

Contamination of groundwater can make water drawn from wells unsuitable for use as potable water or irrigation water although as noted above, the risk of this, for the Project design updates is low:

- Construction of the proposed Project design updates will involve the use/generation of some or all of materials that have the potential to contaminate groundwater, see Section 10.6.3.1 of the SCPX Final ESIA.

Areas considered most likely to be impacted are those where the aquifer is relatively shallow, overlain by a thin layer of porous or permeable sediments (i.e. where groundwater vulnerability\(^1\) is high). The significance of the impact will be, in part, determined by whether or not the groundwater is used for potable and irrigation purposes. As noted above,\(^1\)

\(^1\) Groundwater vulnerability is defined as the tendency and likelihood for general contaminants to reach the water table after introduction at the ground surface.
groundwater in the area of the proposed Project design updates generally has a low importance and sensitivity, and is largely non-potable and unexploited.

The impacts on groundwater quality described above may lead to secondary impacts associated with any need to use alternative water sources or restricted access to existing sources (such as increased cost, with impacts on livelihoods).

**Abstraction**
If excavations (e.g. the pipeline trench) intercept the water table, it may be necessary to install a dewatering system to lower the water table and provide a drier and therefore safer working environment for construction. Such systems typically comprise a series of small well-points (perforated tubes) inserted into the ground around the work area and connected to a vacuum pump. The pumps draw the water out of the ground and thereby lead to a temporary lowering of water table. This effect is restricted to a localised area and the water table returns to its normal level once the pumps are switched off.

**Groundwater flow**
The backfilled material in the trench is likely to have a higher permeability than the surrounding undisturbed material. Where the water table is shallower than the bottom of the trench, or following heavy rains, sections of the trench that have a high topographical gradient may channel rainwater and act as a ‘rapid flow’ conduit for groundwater and rainwater. This may lower groundwater levels above the trench, wash backfill material out of the trench and cause waterlogging or springs to form downslope, where the water leaves the trench.

The above primary impacts may also cause secondary impacts on the recovery of natural vegetation, on agricultural productivity and land-use, for example if impacts restrict the use of land for crops or the access of livestock to water.

**10.6.3.2 In the operations phase**
Small amounts of surface water, sewage and wastewater from bathroom/kitchen facilities may be discharged from the pigging station. Fuel and chemicals will not be stored at the pigging station (with the exception of minor quantities of domestic cleaning materials).

During operation, the presence of the pipeline in the trench may impede groundwater flows in areas where the water table is shallow, which could cause waterlogging upflow direction and cause areas to dry out downflow direction. Potential impacts are as per those identified in Section 10.6.3.1.

**10.6.3.3 Impact summary and assessment of significance**
Table 10-9 in the SCPX Final ESIA provided an assessment of the likely significance of generic ground water impacts before and after implementation of the proposed mitigation measures. The impacts of the proposed Project design updates are similar or less than those for the rest of the SCPX Project so this table in the SCPX Final ESIA should be referred to for this information.

**10.6.4 Mitigation of Impacts on Groundwater**
The relevant generic mitigation measures from the SCPX Final ESIA will be applied to the proposed Project design updates. These mitigation measures relate to activities including:

- Measures to control the storage and use of substance with the potential to cause contamination
- Training of personnel in handling such substances and in appropriate spill response procedures
- Undertaking a risk assessment prior to wastewater discharges
- Water conservation measures
• Installation of trench breakers where necessary and adequate compaction of backfill material.

Reference should be made to Section 10.6.4 and Appendix E of the SCPX Final ESIA for a full description of the mitigation measures. There are considered to be no site-specific groundwater sensitivities associated with the Project design updates and hence no additional site-specific mitigation measures are deemed to be required.

10.6.5 Residual Impacts on Groundwater
If the proposed mitigation measures are implemented, the residual impacts on groundwater of the Project design updates are considered to be of low significance.

10.7 Ecology
This section discusses potential impacts on flora and fauna during construction and operation of the proposed Project design updates and associated mitigation measures to be adopted.

10.7.1 Aspects of the Project Design Updates that Could Affect Ecology
The following planned activities associated with the Project design updates could affect habitats and disturb fauna in the Project area during construction and commissioning:

• Clearance of vegetation and soil from the ROW and pigging station
• Construction of any necessary borrow pits
• Storage of soil from ROW and pigging station
• Pipe stringing
• Trench excavation
• Disposal of surplus soil from the pipeline trench
• Use of plant and vehicles on the ROW and at the pigging station
• Use of equipment that generates noise on the ROW and at the pigging station
• Lighting on the ROW and at the pigging station
• Disposal of solid and liquid wastes
• Abstraction of water from streams and rivers for hydrotesting of the pipeline
• Disposal of trench water and hydrostatic test water
• Construction of river crossings
• Permanent removal of habitat for the pigging station
• Accidental spills of chemicals and fuel.

Activities during operation of the pipeline that may have ecological impact are:

• Patrolling of the pipeline by security personnel, if this impacts on reinstatement
• The installation of new or additional hard bank reinforcement measures such as gabions or rip-rap at watercourses where needed by subsequent natural erosion processes
• Lighting at the pigging station.

10.7.2 Key Sensitivities
The main ecological receptors that could be affected by the construction and operation of the Project design updates are ecosystems, habitats and species. Ecosystems and habitats are vulnerable to habitat loss, severance, fragmentation and degradation, both during
construction and following reinstatement. Species may be vulnerable at the individual or population level, to direct mortality or to indirect effects such as disturbance and restrictions to dispersal as a result of habitat severance. The value of habitats is assessed according to a range of standard criteria, of which the most important are naturalness, rarity and extent (assessed at various scales from local to international). Species may be valuable if they are listed on national or international lists of rare or threatened species i.e. the Azerbaijan Red Data Book (RDB) or the IUCN Red List. These habitats and species of high ecological value are the basis for the selection of key ecological sensitivities, which are described below.

The proposed new pigging station location and additional pipeline route passes through a landscape where the natural habitat is clayey desert. A proportion of the natural habitat has been replaced by cultivated agricultural land, made possible by irrigation from the Pirsaat river, which crosses the proposed route at KP18. The agricultural land is not especially sensitive to significant ecological impacts beyond those resulting from the existing land use (which primarily involves annual tilling of the soil and replacement of the vegetation). The clayey desert habitats are moderately species-rich and are particularly vulnerable to soil compaction. Vegetation cover in these habitats may not recover quickly following disturbance.

Most animal species associated with the clayey desert habitats tend to occur at low density and surveys show that the majority of species likely to be encountered are common and widespread. Some uncommon species have been found on the proposed route, and desktop data indicates that some other species may occur here even though they have not been recorded during surveys.

The following list provides a summary of the key sensitivities:

- Clayey desert habitats sensitive to soil compaction and slow recovery of vegetation cover between KP0-8 and KP18-34.
- A RDB plant species, *Iris acutiloba*, which could be found on the proposed route between KP0-8 and KP18-34 and at the pigging station location.
- Reptiles and amphibians associated with the Pirsaat River and small watercourses in the agricultural land (including some RDB and IUCN Red List species such as European pond terrapin (*Emys orbicularis*) – IUCN NT and Transcaucasian rat snake (*Zamenis hohenackeri*) – RDB), which are particularly vulnerable when breeding (typically April to July) and hibernating (typically October to March).
- The spur-thighed tortoise (*Testudo graeca*) – RDB, IUCN VU, which could be found on the proposed route or at the pigging station.
- Ground-nesting birds can be potentially found along the proposed ROW and temporary facility locations, mostly comprising common species but with low potential for *Francolinus francolinus* (black francolin) – IUCN LC, RDB, and wintering birds such as *Tetrax tetrax* (little bustard) – RDB, IUCN NT.
- The pipeline does not cross any areas protected for ecological reasons.

### 10.7.3 Impacts on Ecological Resources

#### 10.7.3.1 Proposed pipeline construction and commissioning, including pigging station

The potential ecological impacts of the proposed Project design updates are generally the same as those for the SCPX Project as a whole. As such, reference is made to the SCPX Final ESIA, where appropriate, to avoid repetition of identical impacts. Impacts associated with the additional section of pipeline, due to the sensitivities described in Section 10.7.2., are described below.

**Habitats and plant species**

Pipeline construction will affect approximately 24km of non-agricultural land; the remaining 10km of the route is agricultural land of little ecological value.
Pipeline construction between KP0 and KP34 could result in the loss of Iris acutiloba if any are growing on the ROW in this location.

Other potential impacts of construction of the additional sections of pipeline on habitats and plant species (biodiversity reduction, habitat severance, soil quality) will be similar to that described in the equivalent section of the SCPX Final ESIA which should be referred to for this information.

**Fauna**

The impacts of construction and commissioning on fauna are to some extent dependent on the timing of works and the relative seasonality of species’ behaviour. Most animal species are particularly vulnerable during the breeding season (April to July) and hibernating season (October to March). The precise timing of these behaviours is highly dependent on seasonal weather variation.

**Fish**

Fish surveys were completed at the Pirsaat crossing in December 2013. This river is very similar to the Agsu and Karabakh Canal where fish surveys were completed in 2011. The surveys at the Pirsaat recorded a range of common species and no RDB species. The surveys at the Agsu and Karabakh also only found common and widespread fish species. Given that these surveys only provide a snapshot of fish diversity at the times of the surveys, it is possible that other species could be found in the rivers. However, there is little habitat diversity at the proposed crossing point, and it is therefore unlikely that any notable fish species will spawn at this river crossing. The flow and turbidity of the river varies throughout the year, but at peak flows it is fast-flowing and very turbid.

The Pirsaat river will be crossed using an open-cut crossing method (see Section 5.6) Potential impacts of open-cut crossing on fish (the creation of a barrier, degradation of fish spawning habitat, sediment release) will be similar to that described in the equivalent section of the SCPX Final ESIA, which should be referred to for this information.

**Riparian bank-nesting fauna**

Riparian bank-nesting fauna are vulnerable to disturbance and mortality during the breeding season (nominally April to July), and to habitat loss, degradation or fragmentation. It is possible that Lutra lutra (Eurasian otter – RDB, NT) could commute along the Pirsaat, but there is no habitat at the proposed crossing point where they would be likely to rest up or breed.

Otters feed largely on fish and other aquatic animals. They breed in holts, typically in overhanging tree roots or fallen dead wood and prefer watercourses with dense riparian vegetation. Otters were common in Azerbaijan up to at least the 1980s although there is no up-to-date data on their populations. Owing to their dependence on aquatic food (particularly fish), they are vulnerable to water pollution and to habitat loss if their holts are destroyed or if there is a loss or fragmentation of riparian habitat.

Lutra lutra habitat could be affected by any proposed hard bank reinforcement to combat erosion issues if they are present at the watercourse, although such works are unlikely to impact a significant proportion of the habitat in the natural range of these species.

Several other widespread animal species also nest in burrows in riverbanks, including Alcedo atthis (kingfisher) and Merops apiaster (bee-eaters) and they are similarly vulnerable to disturbance or mortality. There was no evidence that these species use the Pirsaat at the proposed crossing point in this way, so there is only a very low risk of a negative effect.

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**Movements of riparian species**

At open-cut crossings there is the potential for water flow within the rivers to be temporarily impeded. This will mean that riparian species (such as *Lutra lutra*) would not be able to travel along the watercourse at the construction location (if they are present). However, works will not continue into the night and heavy machinery/equipment will not be left at the river’s edge overnight. As such, animal movements along the riverbanks will not be impeded during the short duration of open-cut crossings. This will allow species to continue moving along the river banks or to exit the water either side of the works area, travel along the banks, circumnavigate the working width and re-enter water at the other side.

**Mammals, amphibians and reptiles**

There are several species of bats that could be found along the route, including some RDB species:

- Barbastelle bat (*Barbastella leucomelas*) – RDB
- Lesser horseshoe bat (*Rhinolophus hipposideros*) – RDB
- Botta’s serotine bat (*Eptesicus battoae*) – RDB
- Lesser mouse-eared bat (*Myotis blythii*) – RDB.

Bats roost in a variety of structures depending on the time of year (winter roosting needs differ from summer roosting needs). The general need is for locations sheltered from extremes of weather, out of the reach of predators and where there is a suitable temperature regime. Features that could be encountered along the route where bats might roost include:

- Buildings (particularly those with roof voids)
- Large, old trees with cavities.

If any of these features were to be removed during construction then there is a risk that bats could be killed or disturbed, and that roosting habitat would be lost. Construction of the pipeline could also result in temporary loss of small amounts of foraging habitat. The scale of this impact is likely to be very small as there is abundant alternative habitat in the surrounding landscape.

The proposed additional section of route is unlikely to be used by any of the RDB amphibians that occur in Azerbaijan. There are two RDB reptiles and one IUCN Red List reptile that are relatively widespread in the area crossed by the proposed additional section of route, which could therefore be encountered here.

*Zamenis* (*Elaphe*) *hohenackeri* (ladder snake; LC, RDB) prefers scrub and tall riparian habitat but is less common away from wetland habitats. This species is considered of medium importance and sensitivity. It could be found in field-edge habitats amongst the agricultural fields.

*Emys orbicularis* (European pond turtle; NT) is found in or near slow-moving and stagnant waters. It was recorded in a range of watercourses on the SCPX route, but not on the proposed additional section of route. It lays eggs in a nest in the ground or in vegetation, and may return to the same nest site year after year. The species is considered of medium importance and sensitivity. It is possible that it could be found in minor irrigation channels amongst the agricultural fields.

*Testudo graeca* (spur-thighed tortoise; VU, RDB) inhabits dry open areas and can be found in most habitats crossed by the proposed additional section of route, except for cultivated agricultural land where it is likely to be found only occasionally. Mating begins shortly after the animals emerge from hibernation, and females may lay several clutches of eggs in a year from spring to summer. Individual animals are vulnerable to vehicles and machinery,
both during the active season (as they move very slowly) and in winter when they may be found hibernating beneath dense vegetation such as at the bases of trees and shrubs. Egg clutches would also be vulnerable to ground clearance works. Overall, the species is widespread in the region crossed by the proposed additional section of pipeline and therefore population levels are unlikely to be at risk from construction. It is therefore considered of medium importance and sensitivity.

Other potential impacts of construction of the additional sections of pipeline on mammals, reptiles and amphibians are listed below:

- Clearance of the ROW may disturb hibernating animals
- Earth-moving equipment may destroy burrows, nests and breeding sites and vehicles on the access roads could run over slow-moving animals
- Noise from plant and machinery and blasting during construction could result in disturbance of wildlife
- Clearance of the ROW, soil storage piles, pipeline stringing and the opening of trenches may present a temporary barrier to movement for small mammals, amphibians and reptiles
- Trenches and other excavations involve a risk that individual animals may fall in, be injured by the fall or not be able to escape from the hole
- Accidental spills and uncontrolled disposal of solid wastes or chemicals, could have impacts on terrestrial flora which could have localised impacts on terrestrial fauna
- Dust from construction works or from soil storage piles can adversely affect the respiration of animals.

**Birds**

Ground-nesting birds potentially nest in all habitats along the route, with a preference for areas with good vegetation cover and low disturbance. They are especially vulnerable during the breeding season (nominally April to July), when eggs could be destroyed, adults could be disturbed resulting in nests being abandoned or vegetation clearance could have the secondary impact of increasing the risk of predation. Outside of the breeding season these birds are much less sensitive to construction as they are able to move away from temporary disturbance. The majority of the ground-nesting bird assemblage of the ROW comprises common and widespread species, and therefore individual animals may be affected but overall populations are extremely unlikely to be threatened. The black francolin (*Francolinus francolinus* – RDB, LC) has been recorded from the proposed route during surveys in November 2013. This species has a large and stable global population, but it is classed as endangered in the Azerbaijan RDB. It nests in spring, on the ground in desert habitats and on agricultural land. The nests would therefore be vulnerable to disturbance or loss if they are present on the proposed route.

Wintering birds may use semi-natural habitats along the ROW, but they are not especially sensitive to disturbance as they are able to move away from disturbance, and there is abundant alternative habitat outside of the ROW. The ROW does not pass through any areas noted for large populations of wintering birds. Therefore, construction and commissioning could cause short-term disturbance effects but overall populations are extremely unlikely to be threatened.

The pipeline also does not cross any major wetland area or lake that may be important for breeding, migrating or overwintering birds.

In summary then, the potential impacts of construction on the key sensitive receptors are:

- Loss, degradation or fragmentation of a proportion of sensitive habitats
- Loss of a proportion of the local population(s) of *Iris acutiloba* -RDB
• Reduced primary productivity in watercourses, smothering of invertebrates, lethal or sub-lethal effects on fish (including degradation of spawning habitat) or other aquatic biota
• Young animals in burrows, and eggs or chicks are in the nests could be destroyed
• Disturbance or mortality of terrestrial fauna (e.g. Testudo graeca) in all seasons during clearance of vegetation and topsoil from the ROW
• Loss of bat roosting habitat (although this is very unlikely), temporary loss of foraging habitat, and potential disturbance to commuting or foraging from artificial lighting
• Disturbance or mortality of ground-nesting birds during the breeding season (nominally April to July) during clearance of vegetation and topsoil from the ROW
• Disruption to movement and migration of fauna.

10.7.3.2 In the operations phase

The proposed new pigging station at KP0 is located in semi-natural clayey desert (Salsolosum-nodulosae), a habitat that is considered to be of moderate ecological value and high sensitivity to disturbance.

An impressed current cathodic protection system will be used to protect the pipeline from corrosion, see Section 5.4.6. This system is used across the world and a literature search has not found any records of it causing any effects at the surface, for example, on animal movement.

During operation the ongoing maintenance and inspection of the pipeline could cause disturbance to flora and fauna. In particular, driving along the ROW after reinstatement (on un-surfaced routes) can prevent the recovery of vegetation and lead to permanent habitat loss, degradation and fragmentation. However, BTC/SCP operations staff are only permitted to drive along the ROW in an emergency.

Over the lifetime of the Project, the installation of new or additional hard bank reinforcement measures such as gabions or rip-rap at watercourses may be needed if natural erosion processes occur at crossings following installation of the pipeline. This has potential to result in the impacts on watercourses as discussed above in Section 10.7.3.1.

The lighting at the pigging station has potential to impact on bats (see Section 10.7.3.1).

10.7.3.3 Impact summary and assessment of significance

Table 10-12 in the SCPX Final ESIA provided an assessment of the significance of potential generic impacts on ecology before and after implementation of proposed mitigation measures. The general impacts of the proposed Project design updates are the same as those for the rest of the SCPX Project so this table in the SCPX Final ESIA should be referred to for this information.

Table 10-5 below provides an assessment of the significance of site specific ecological impacts as a result of the Project design updates before and after implementation of the proposed mitigation measures that are discussed in the following section. This table includes the revised location of the pigging station.
### Table 10-5: Ecological Assessment at Sensitive Locations and/or Receptors

<table>
<thead>
<tr>
<th>Location</th>
<th>Sensitive Receptor</th>
<th>Potential Impacts</th>
<th>Potential Impact Significance*</th>
<th>Mitigation</th>
<th>Residual Impact Significance*</th>
</tr>
</thead>
<tbody>
<tr>
<td>KP0–8 and KP18-34</td>
<td>Iris acutiloba (RDB plant species)</td>
<td>Loss of a small percentage of the local population of Iris acutiloba</td>
<td>C3 Medium</td>
<td>X7-32, 19-10</td>
<td>C1 Low</td>
</tr>
<tr>
<td>KP3.5-KP4.7</td>
<td>Desert habitats</td>
<td>Habitat loss and potential for slow revegetation due to risk of erosion</td>
<td>D2 Medium</td>
<td>X7-25b, 19-10</td>
<td>D1 Low</td>
</tr>
<tr>
<td>KP18-34</td>
<td>Desert habitats where vegetation on adjacent BTC route has been slow to recover</td>
<td>Potential for cumulative habitat loss, fragmentation and degradation in combination with slow recovery on BTC ROW</td>
<td>D2 Medium</td>
<td>X7-25a, X7-25b</td>
<td>D1 Low</td>
</tr>
<tr>
<td></td>
<td>Iris acutiloba (RDB plant species)</td>
<td>Loss of a small percentage of the local population of Iris acutiloba</td>
<td>C3 Medium</td>
<td>X7-32, 19-10</td>
<td>C1 Low</td>
</tr>
<tr>
<td>KP18 (Pirsaat)</td>
<td>Riparian habitats and their use as a wildlife corridor</td>
<td>Habitat loss, fragmentation affecting use of the river as a movement corridor</td>
<td>C2 Low</td>
<td>X7-28a-b, 17-14, 19-11a-e, D5-045, 17-05, 17-07, 17-10, 17-11</td>
<td>C1 Low</td>
</tr>
</tbody>
</table>

* assessed using Tables 3-11 and 3-12

#### 10.7.4 Mitigation of Ecological Impacts

The general ecological mitigation measures described in Section 10.7.4 and listed in Appendix E of the SCPX Final ESIA will be applied and are therefore not repeated in full here to avoid repetition.

The relevant generic mitigation measures from the SCPX Final ESIA will be applied to the proposed Project design updates. These mitigation measures relate to activities including:

- Restrictions of vehicle movements; hunting, fishing or unauthorised gathering of products; workforce training
- Tree inventories, compensation planting and monitoring
- Measures to mitigate for impeding movements of wild animals
- Use of fish screens in certain situations prior to water abstraction
- Reinstatement and re-vegetation and bio-restoration monitoring
- Mitigation measures associated with soil, surface water and groundwater impacts will also mitigate against indirect ecological impacts e.g. from a reduction in soil fertility or surface water contamination.

The site-specific impacts of the proposed Project design updates will be addressed using the commitments listed in Table 10-5. These are also commitments that were developed for the SCPX Final ESIA, and reference should therefore also be made to Section 10.7.4 of the SCPX Final ESIA and Appendix E of the SCPX Final ESIA for this information.
A minor change is needed to commitment X7-32 to ensure a preconstruction assessment for the presence of *Iris acutiloba* on the proposed additional section of ROW will be undertaken prior to construction:

- A preconstruction survey (in April or May depending on seasonality) will be carried out by the Company and will seek to identify the presence of *Iris acutiloba* on the ROW or working areas at specific locations determined by COMPANY and a site specific ecological management plan will be developed. This will be completed when the plants are visible i.e. during or after the flowering season between April and May.

### 10.7.5 Residual Impacts on Ecology

This section discusses the residual ecological impacts after mitigation has been implemented, following the order in Table 10-12 of the SCPX Final ESIA and Table 10-5. In summary, the likely residual impacts of predicted low significance are:

- Small-scale soil compaction on the ROW from vehicle movements affecting less than 1% of the total amount of any habitat type within the Project zone of influence
- Barely discernible amounts of eroded soil entering watercourses with little or no effect on aquatic habitat quality or biota
- Very small reductions in ecological functions of reinstated soil, recovering in the long term
- A small risk of short-term, small-scale impacts on flora and fauna from accidental release of solid or liquid wastes
- A small risk of localised habitat loss from disposal of surplus subsoil affecting less than 1% of the total amount of any habitat type within the project zone of influence
- A small-scale, short-term effect of erosion and small increases in suspended sediments in watercourses from disposal of trench water or hydrotest water, unlikely to exceed background levels
- Potential for a temporary interruption of flow in watercourses constraining the movement of aquatic and riparian fauna, outside of the fish spawning season
- Little or no impact on riparian habitats from interruption of river flow
- Little or no impact on fish or other aquatic biota from water abstraction
- Temporary loss of terrestrial plant biodiversity, habitat structure and vegetation cover on the ROW, recovering after five to ten years
- Temporary loss of riparian or aquatic plant biodiversity at river crossings, recovering after one to three years
- Potential for permanent habitat loss if river crossings need hard reinforcement, compensated by offsetting
- Temporary loss of foraging and breeding habitat for terrestrial fauna, causing displacement of individuals but unlikely to result in reduction of populations or to have a discernible impact over more than one generation
- A temporary barrier to dispersal or movement of terrestrial fauna during construction, resulting in changed behaviour but very unlikely to result in mortality or reduction of populations. However, the impact is unlikely to be significant owing to the provision for continued access across the working width incorporated in the mitigation measures. In addition, the pipeline only affects a very small percentage of the available habitats in the region. These habitats are extremely large and homogenous. As such, there are no discrete areas that are likely to concentrate animals in a single location. Therefore, animals will still be able to travel over large areas either side of the pipeline route (and cross the route in certain locations). Based on the animals identified in the area, no significant impacts are predicted, as
both sides of the pipeline route can still accommodate all ecological requirements of the species

- Temporary removal, dispersal or disturbance of non-breeding terrestrial animals during construction, very unlikely to result in mortality or reduction of populations
- Short-term increases in suspended sediment in rivers during river crossings of low significance as it is unlikely that any notable fish species will spawn at this river crossing
- Temporary displacement or disturbance of non-breeding riparian fauna during open-cut river crossings
- Re-location of RDB plant species (*Iris acutiloba* or other RDB plant species if found) off the ROW and small loss of individuals as a result of translocation
- Impacts on vegetation recovery of pipeline patrols during the operational period
- Impacts on site vegetation or trees bordering construction camp, pipe storage and rail spur and offloading areas.

There are some activities that could result in medium significance impacts, depending on how they are managed, but in this instance, the residual impact is expected to remain low as discussed below:

- The predicted impacts on *Testudo graeca* (spur-thighed tortoise) and on other terrestrial and bank-nesting IUCN Red List or Azerbaijan Red Data Book fauna are generally low, due to the mitigation measures proposed. There is a low risk that impacts could be medium if, despite the mitigation measures proposed, breeding success was affected, but this is not felt to be a real risk on the proposed additional section of pipeline, so the residual impact is predicted to remain low.

### 10.8 Air Quality and Greenhouse Gas Emissions

This section covers emissions of atmospheric pollutants and greenhouse gases during construction and operation of the proposed Project design updates and associated mitigation measures to be adopted.

#### 10.8.1 Aspects of the Project Design Updates that have the potential to Emit Atmospheric Pollutants and Greenhouse Gases

The main air quality impacts from the proposed Project design updates will be during construction. Minimal impacts are envisaged during operation, as additional compressor stations are not needed in Azerbaijan and impacts from operation and maintenance of the pipeline and pigging station are expected to be minimal.

The following planned Project activities involve fuel combustion during the construction phase:

- Operation of diesel powered vehicles on roads to and from the ROW, pigging station and along the ROW
- Operation of diesel powered construction plant during construction at the ROW, and pigging station (NOx, CO, SO2, VOC, PM10).

During the operations phase, combustion emissions will be limited to minor emissions from:

- Intermittent/occasional operation of temporary diesel generator at the pigging station, if needed to supply extra power
- Operation of the diesel generators, which will replace the TEGs originally planned to be installed at the pigging station
- Vehicles and plant for pipeline inspection and maintenance.
Minor fugitive emissions will occur during the refuelling of vehicles and from on-site fuel trucks during construction. During the operations phase, the following activities have the potential to emit fugitive unburnt hydrocarbons:

- Fugitive emissions from valves and connections at the pigging station (VOC, mainly methane)
- Venting during routine maintenance/testing at the pigging station during the operation phase (VOC mainly methane) (emergency venting is discussed in Chapter 12).

The following planned Project construction activities have the potential to raise dust levels that could, in turn, cause disturbance to local residents by, for example, depositing dust on windows, clothes drying outside and vegetables growing in gardens:

- Clearing, soil removal and stockpiling at ROW, and pigging station
- Vehicle movements on roads to and from the ROW, pigging station and along the ROW
- Pipeline trenching
- Extraction and placing of aggregate for road construction and construction of the pigging station
- Operation of concrete batching plants and borrow-pits – sites for these have yet to be decided.

No significant sources of dust are predicted during the operations phase.

Specific emissions during commissioning will comprise combustion emissions from generators, as described in Sections 5.7.2 and 5.7.4 of the SCPX Final ESIA.

10.8.2 Key Sensitivities

Human health is sensitive to exposure to levels of atmospheric pollutants that exceed the ambient air quality standards, as discussed in Section 10.8.2 of the SCPX Final ESIA.

Key sensitivities with respect to air quality, in particular dust generation are as follows:

- Particular soil types, present along the route of the additional section of the SCPX pipeline, may be prone to generate large amount of dust in dry conditions during construction. This may be exacerbated in the long term due to predicted decrease of precipitation in summer months according to climate change scenarios
- The proposed SCPX route passes close to a farm at SCPX KP19 and the access road to the pigging station is, at its closest point, 230m from a farm at Goltug. These receptors are considered sensitive to increased levels of dust generated by the movement of Project vehicles, primarily during construction of the pipeline
- Elsewhere, the pipeline route primarily passes through agricultural land used for grazing and production of cereal crops, which will have a low sensitivity to air quality.

The location of access roads which will be used by Project vehicles to access the pipeline ROW is as yet unknown. Communities and houses close to unsurfaced and aggregate surfaced access roads are expected to be particularly sensitive to dust generation in dry conditions.
Potential sensitive receptors during the operational phase include any communities and isolated residences in the vicinity of the pigging station. This location is however remote from dwellings (see Section 10.9) and therefore the sensitivity is considered likely to be low.

10.8.3 Potential Impacts on Air Quality and Greenhouse Gas Emissions

10.8.3.1 Proposed pipeline construction, commissioning and operational phases, including pigging station

The potential impacts of the proposed Project design updates are generally the same as those for the SCPX Project as a whole. These are described below, along with any particular impacts associated with the additional section of pipeline, due to the sensitivities described in Section 10.8.2.

Release of combustion gases

Gaseous emissions from construction vehicles and equipment will consist primarily of combustion gases from additional transport and traffic during construction and the operation of construction equipment. Standard construction vehicles and equipment will be employed which typically includes compressors, earthmoving equipment, pipe laying machinery, tractors and small generator sets to provide electrical power. These may locally increase concentrations of atmospheric pollutants (NOx and SO2) to a limited extent, but as they are from mobile sources spread over a wide area that are in use for a limited period of time, the increase has not been modelled.

Welding activities may additionally produce minor releases of metal and oxides of nitrogen but these will be very small, highly localised and are expected to rapidly disperse.

Total estimated combustion emissions during construction are given in Section 5.10.7.

During operations, minor amounts of combustion gases will be generated from the following activities:

- Intermittent/occasional operation of a temporary diesel generator at the pigging station, if needed to supply extra power
- Security patrolling of the ROW by vehicles.

Given the generally good ambient air quality in the Project area compared to applicable air quality standards, it is considered highly unlikely that proposed SCPX Project derived combustion gas emissions during either construction or operations will lead to an exceedance of SCPX Project Ambient Air Quality Standards.

Secondary impacts from releases of combustion gasses include impact to human health including respiratory disease, see Section 10.12.3.

Fugitive emissions

During operations, minor fugitive emissions of hydrocarbons may occur from valves and flanges at the pigging station.

Greenhouse gas emissions

Greenhouse gasses (GHG) such as carbon dioxide, methane and VOCs will be generated during both the construction and operations phases of the proposed Project design updates. Carbon dioxide will be emitted from all engines and combustion equipment used by the Project during construction and operation. Estimated overall emission quantities during construction are given in Section 5.10.7.

In addition, during the operations phase, there will be GHG emissions from the pigging station associated with planned venting operations. Fugitive releases will also occur from the flanges and connections at the proposed pigging station. Methane is a more potent
greenhouse gas than carbon dioxide. Estimated overall quantities of GHG emissions (as CO$_{2eq}$ equivalent) are given in Section 5.10.7.

During both construction and operation, the quantity of greenhouse gases emitted is considered relatively low.

**Dust/particulate matter generation**

Overall, the general impacts of the release of dust/particulate matter generation during construction and operation will be as described in Section 10.8.3 of the SCPX Final ESIA.

### 10.8.3.2 Impact summary and assessment of significance

The generic impacts on air quality are as reported in Table 10-14 of the SCPX Final ESIA, which should be consulted for this information.

Table 10-6 provides an assessment of the likely significance of potential site specific or additional air quality impacts as a result of the Project design updates before and after implementation of the proposed mitigation measures that are discussed in the following section.

#### Table 10-6: Air Quality Impact Assessment at Sensitive Locations and/or Receptors

<table>
<thead>
<tr>
<th>Location</th>
<th>Issue</th>
<th>Potential Impacts</th>
<th>Potential Impact Significance*</th>
<th>Mitigation</th>
<th>Residual Impact Significance*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pigging station access road (KP0)</td>
<td>Dust generation from vehicle movements; topsoil and vegetation clearance</td>
<td>Disturbance to residents as sites are close to access road</td>
<td>E3 Medium</td>
<td>X8-04, 23-05, 23-06, 24-01, 24-02</td>
<td>E2 Medium</td>
</tr>
<tr>
<td>KP19</td>
<td>Dust generation, particularly from vehicle movements</td>
<td>Disturbance and reduced air quality for resident(s)</td>
<td>D4 High</td>
<td>X8-04, 23-05, 23-06, 24-01, 24-02</td>
<td>D3 Medium</td>
</tr>
</tbody>
</table>

* assessed using Tables 3-13 and 3-14

#### 10.8.4 Mitigation of Emissions

The mitigation measures described in Section 10.8.4 and listed in Appendix E of the SCPX Final ESIA will be applied to the proposed Project design updates to manage impacts on air quality. They are therefore not repeated here in full to avoid repetition. These mitigation measures relate to activities including:

- Maintenance of vehicles and equipment
- Dust suppression measures e.g.:
  - Damping down of work areas and access roads
  - Speed limit on unmade tracks and the ROW
  - Sheetng of vehicles carrying fine aggregate materials
- Preventative maintenance during the operations phase
However, a minor change is needed to commitment X8-04 to add the additional locations requiring site-specific dust control, as follows:

- At locations where the proposed SCPX route passes in close proximity to dwellings and at camps and pipe storage yards close to dwellings, the Project will undertake monitoring for dust generation and damp down as necessary.

**10.8.5 Residual Impacts on Air Quality and Climate**

Upon implementation of the above mitigation measures, the residual impacts associated with combustion emissions and greenhouse gas emissions will be of low significance.

Although a short-term increase in dust levels during construction is unavoidable, they are considered to be generally of low significance as visual observations show that existing background dust levels are high during windy conditions and when existing vehicles travel along unmade tracks. However, where construction vehicles will be passing close to dwellings (KP19 and the pigging station access road) the residual impact could be of medium significance due to the sensitivity of the receptors and their close proximity to the dust generating activities. Particular attention will be paid to the implementation of the proposed mitigation measures at these locations.

The long-term impact of dust will decline as stripped areas of land revegetate. Due to the temporary nature of construction, dust emissions are not anticipated to have a long-term impact on local air quality.

**10.9 Noise and Vibration**

This section sets out potential impacts due to noise and vibration generation during construction and operation of the proposed Project design updates and associated mitigation measures to be adopted.

**10.9.1 Aspects of the SCPX Project Updates that Could Generate Noise and Vibrations**

The following planned Project activities could generate noise and vibrations in the Project area:

- **Construction**
  - Logistics and use of access roads by construction vehicles
  - The maintenance and use of vehicles, plant and equipment during construction
  - Use of construction plant on the ROW and at the pigging station
  - Topsoil stripping and grading
  - Stringing pipe
  - Cold pipe bending
  - Pipe welding
  - Excavation (e.g. pipeline trench on ROW and equipment foundations at the pigging station)
  - Pipe lowering and backfilling of the trench
  - Piling activities during construction – this may be needed at the pigging station
  - Operation of borrow pits and concrete batching plants – the locations of these sites has yet to be decided.

- **Commissioning**
  - Running pumps and compressors during hydrotesting
  - Drying and venting activities during testing and commissioning.
During operation, small-scale noise and vibration may be emitted in the form of:

- Operation of the Diesel Generators at the pigging station
- Planned venting at the pigging station approximately every 2–5 years during pig launching
- Vehicle patrolling and maintenance of the ROW, plus use of access roads.

10.9.2 Key Sensitivities

The pipeline is generally routed through areas with very few noise and vibration-sensitive receptors. Sensitive receptors include communities or dwellings through which the pipeline or access roads are routed, which may have schools, hospitals or dwellings close to the route. In addition, known archaeological monuments may be sensitive to vibration.

Mobile receptors, such as people and animals passing close to the works, generally have the ability to move away from the source of the noise, although this may be an inconvenience to them and could temporarily restrict the availability of land for grazing.

Key sensitivities in the area of the proposed SCPX Project with respect to noise and vibration are:

- The proposed SCPX route passes in close proximity to dwellings at the three isolated farms at SCPX KP6 (310 m), KP19 (80 m) and KP27 (345 m), where there will potentially be sensitivity to increased noise during the construction period
- At other locations the proposed extension passes through rural areas where ambient noise levels, particularly at night, can be expected to be low or very low. This may lead to complaint when construction activities need to be carried out overnight (e.g. pipeline testing or horizontal directional drilling)
- Proposed access roads are likely to use currently quiet rural roads. The location of the access roads has yet to be decided with the exception of the access road to the pigging station at SCPX KP0, which is located 230 m from Goltug farm. This road is only lightly used by traffic at present
- Residents of Goltug farm situated approximately 625 m from the new pigging station would be sensitive to noise during the period of construction, in particular night time noise, from the pigging station.

10.1.1 Sensitive Receptors

Exposure to noise at extremely high levels for a long period of time can harm the hearing of humans and animals. At lower levels noise can be perceived as a nuisance, particularly to people who are not able to move away from the source of the noise and need to communicate (e.g. people in schools) or rest (hospitals, dwellings when people are trying to sleep).

The closest receptors which would be deemed to be sensitive to relative noise changes as well as absolute noise levels are as follows:

**Pipeline**

Receptors within 450m of the proposed additional sections of pipeline are identified in Table 10-7.
Table 10-7: Proximity of Receptors to Additional Pipeline Sections

<table>
<thead>
<tr>
<th>Approximate KP</th>
<th>Direction of Receptor</th>
<th>Distance (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>NE</td>
<td>625</td>
<td>A small farm community with approximately 5 families</td>
</tr>
<tr>
<td>6</td>
<td>S</td>
<td>310</td>
<td>A small farm</td>
</tr>
<tr>
<td>19</td>
<td>S</td>
<td>80</td>
<td>Semi derelict dwelling used seasonally</td>
</tr>
<tr>
<td>27</td>
<td>S</td>
<td>345</td>
<td>Seasonally used dwelling</td>
</tr>
</tbody>
</table>

10.9.3 Noise and Vibration Impacts

10.9.3.1 Noise during pipeline construction including pigging station

The potential impacts of the proposed Project design updates are generally the same as those for the SCPX Project as a whole. These are described below, along with any particular impacts associated with the additional section of pipeline, due to the sensitivities described in Section 10.9.2.

General construction noise

The impacts on noise caused by general construction of the additional sections of pipeline will be similar to that described in Section 10.9.3 of the SCPX Final ESIA. The proposed additional section of pipeline ROW generally passes through rural areas with very few noise-sensitive receptors, where the background noise is mainly generated by birdsong and insects or agricultural activities. Pipeline and pigging station construction activities will be louder than the baseline noise sources, and will vary according to the equipment being used. Reversing vehicles sound warning signals that are generally louder than the operating equipment. The combination of machinery being used at any one time during the construction process will vary, and noise levels will fluctuate accordingly.

This assessment has been prepared using the most recent, typical noise data available for pipeline construction activities. Typical noise values have been calculated using the procedures described in BS 5228-1:2009. Table 10-8 shows typical noise levels that may be expected at various distances from the ROW.

Table 10-8: Typical Noise Levels Associated with Various Construction Activities

<table>
<thead>
<tr>
<th>L_{Aeq} [DB] Calculated from BS 5228 at Varying Distances from ROW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Activities</td>
</tr>
<tr>
<td>----------------------------</td>
</tr>
<tr>
<td>Initial access and fencing</td>
</tr>
<tr>
<td>Site preparation and ROW</td>
</tr>
<tr>
<td>Topsoil stripping and site grading</td>
</tr>
<tr>
<td>Pipe haul and stringing</td>
</tr>
<tr>
<td>Cold pipe bending</td>
</tr>
<tr>
<td>Mainline welding</td>
</tr>
<tr>
<td>Trench excavation</td>
</tr>
<tr>
<td>Pipe lower, lay and tie-in</td>
</tr>
<tr>
<td>Backfilling</td>
</tr>
</tbody>
</table>

\[ L_{Aeq} \] is the A-weighted continuous equivalent sound pressure level, an average value used to represent fluctuating noise sources, as heard by the human ear.
During construction, noise emissions will be assessed in accordance with BS 5228-1 (2009), E3.3. Example Method 2: 5dB(A) change. As stated by this method, the following noise standards will be applied to construction noise activities of duration of one month or longer.

The intention is that noise levels generated by construction shall not increase the pre-construction ambient noise by 5dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45dB LAeq, Period, from construction noise alone, for the daytime, evening and night-time periods, respectively.

For short duration noise activities at construction sites, less than one-month duration, e.g. venting during commissioning and piling, a risk assessment will be applied to the need to meet Project noise standards. However, in the event that noise levels are predicted to exceed these levels a risk assessment shall be carried out to understand the predicted noise levels, the duration that the levels will be exceeded and potential mitigation measures that could be applied to reduce noise levels, as far as practicable.

The data from the above table suggests that daytime construction noise will be less than 65dB(A) at a distance of approximately 450m, with the noisiest activity being pipe haul and stringing. The proposed SCPX route passes 80m from a dwelling at SCPX KP19, where the 65dB(A) daytime noise limit is likely to be exceeded during most construction activities. However, activities should not extend for more than one month at locations that would result in an exceedance at this receptor.

In general, construction work along the proposed additional section of pipeline ROW will be temporary and discontinuous and will not expose local residents to disturbance from noise for extended periods. At the pigging station, construction noise will be more continuous. Goltug farm is 625 m from the pigging station and therefore daytime noise limits will not be exceeded.

At night, generators may be needed to run security lighting at the pigging station construction site and at road and river crossings.

**Blasting and piling**
The majority of the pipeline trench is through ground that can be excavated by back hoe, tracked excavator or trenching machine. Such materials include unconsolidated clays, sand, friable and weathered rock. No blasting is currently expected to be necessary to construct the pipeline or facilities.

Piling is likely to be limited to temporary piling at non-open-cut crossings but may also be needed at the pigging station.

**Traffic to pipeline ROW**
Construction traffic associated with the pipeline construction will be routed via main roads as much as possible (e.g. the main east–west (Baku-Georgia) highway and main roads to villages from this highway). Some minor roads and tracks will have to be used for access to the pipeline spread, although the exact locations of these access roads has yet to be defined fully.

The increase in traffic movements within small rural villages may cause a noticeable increase in daytime noise levels but this effect is expected to be localised and temporary.

10.9.3.2 Noise during pipeline commissioning and testing, including pigging station
Before the pipe sections are commissioned they will each be subject to a hydrostatic pressure test over a 24-hour period as described in Chapter 5 Project Description. Testing will not give rise to significant noise levels along the pipe section itself, but pumps and air compressors are needed to fill and pressurise the pipeline at the test ends. Noise levels during release of pressure from testing operations can be sudden and significant; however it
is of short duration. Generators may also be needed at selected locations along the route for security lighting at night. The combined noise levels for one diesel pump and one generator predicted from BS 5228-1: 2009 are shown in Table 10-9.

### Table 10-9: Combined Noise Levels from One Diesel Pump and One Generator

<table>
<thead>
<tr>
<th>Distance from Source (m)</th>
<th>50m</th>
<th>150m</th>
<th>250m</th>
<th>350m</th>
<th>450m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise Level L_{Aeq,15min} dB</td>
<td>70</td>
<td>60</td>
<td>56</td>
<td>53</td>
<td>50</td>
</tr>
</tbody>
</table>

It is not known yet where the ends of the test sections will be, therefore it is not possible to assess potential impact significance on individual receptors, although it is likely to be low.

### 10.9.3.3 In the operations phase

The pigging station will operate equipment that generates noise; however this noise will be of low level and the distance to the nearest dwellings from the site is over 600m. Therefore, the operational noise impact is considered of low significance.

Planned venting at the pigging station will take place approximately every 2-5 years after pig launching. This activity will generate increased noise levels which will be of short duration during daytime hours only.

### 10.9.3.4 Vibration during proposed pipeline construction including pigging station

Humans generally become aware of vibration at levels of around 1.5mm s\(^{-1}\), although under some circumstances this can be as low as 0.5mm s\(^{-1}\). Nocturnal animals that rely on noise and vibration in order to locate prey are far more sensitive to vibration than human senses.

Bulldozers and rollers typically generate less than 2mm s\(^{-1}\) at 5m and compactors less than 0.3mm s\(^{-1}\) at 30m. Pile driving typically generates less than 3mm s\(^{-1}\) at 50m. Unless buildings are very close to construction operations, they are unlikely to be damaged by vibrations from the construction plant. Vibration effects would be negligible at 80 m from the SCPX route, the distance of the nearest dwelling at KP19.

### 10.9.3.5 Impact summary and assessment of significance

The generic impacts of construction vibration are as reported in Table 10-19 of the SCPX Final ESIA, which should be consulted for this information.

Table 10-10 provides an assessment of the likely significance of potential site specific or additional noise and vibration impacts as a result of the Project design updates before and after implementation of the proposed mitigation measures that are discussed in the following section.

### Table 10-10: Noise Impact Assessment at Sensitive Locations and/or Receptors

<table>
<thead>
<tr>
<th>Location</th>
<th>Issue</th>
<th>Potential Impacts</th>
<th>Potential Impact Significance*</th>
<th>Receptor-Specific Mitigation**</th>
<th>Residual Impact Significance*</th>
</tr>
</thead>
<tbody>
<tr>
<td>KP0 (Goltug farm)</td>
<td>Noise from construction activities</td>
<td>Noise disturbance</td>
<td>C2 Low</td>
<td>25-04, 25-05, 25-09, X9-04</td>
<td>C2 Low</td>
</tr>
<tr>
<td>KP6, KP27</td>
<td>Noise from construction activities</td>
<td>Noise disturbance</td>
<td>C2 Low</td>
<td>25-04, 25-05, 25-09, X9-04</td>
<td>C2 Low</td>
</tr>
</tbody>
</table>
### Location | Issue | Potential Impacts | Potential Impact Significance* | Receptor-Specific Mitigation** | Residual Impact Significance*  
--- | --- | --- | --- | --- | ---  
KP19 | Vibration from construction activities | Potential risk of damage to buildings in poor state of repair | D2 Medium | 25-13, 23-14 | D1 Low  
| Noise from construction activities | Noise disturbance of herders if house used as seasonal/temporary accommodation by herders when pipeline construction is taking place | C2 Low | 25-04, 25-05, 25-09, X9-04 | C2 Low

* assessed using Tables 3-15, 3-16, 3-17 and 3-18

#### 10.9.4 Mitigation of Noise and Vibration Impacts

The general mitigation measures described in Section 10.9.4 and listed in Appendix E of the SCPX Final ESIA will be applied to construction noise and vibration. They are therefore not repeated here in full to avoid repetition.

This includes:

- For vibration: the use of Project speed limits, pre-construction conditions surveys and vibration monitoring in sensitive areas
- For noise: equipment and vehicle maintenance, design of the site layout, driver training, advance notification to nearby residents of noisy activities and noise monitoring.

The site-specific impacts of the proposed Project design updates will be addressed using the commitments listed in Table 10-10. These are also commitments that were developed for the SCPX Final ESIA, and reference should therefore also be made to Section 10.9.4 of the SCPX Final ESIA and Appendix E of the SCPX Final ESIA for this information.

A minor change is needed to commitment X9-04 to add a receptor to the list of dwellings where an assessment and baseline noise survey will be required prior to construction:

- An assessment and a baseline noise survey will be undertaken prior to construction at any camp and pipe storage areas located within 450m of dwellings, or other sensitive receptors such as schools or hospitals, and at locations where the proposed SCPX route passes in close proximity to dwellings.

#### 10.9.5 Residual Impacts from Noise and Vibration

The above mitigation measures, which are intended to reduce the impact of construction activity noise, and the temporary nature of the noise, will generally result in a low residual impact: the increase in noise will be temporary during construction and will not be continuous; pipeline construction is carried out as a series of discrete activities undertaken by separate teams working along the ROW. There is usually a gap of some weeks between each activity at any one location when noise should be limited to vehicles driving along the ROW.

Noise emissions from commissioning and testing is expected to be of short duration and the people who are most likely to be affected will be notified in advance. The residual impact is considered likely to be of low significance.
Implementation of the proposed mitigation measures is intended to help reduce the risk and severity of building damage from vibration during construction. The residual impact is considered likely to be of low significance.

The effect of operational noise on communities located in the vicinity of the pigging station is not expected to be significant due to the distance to the nearest communities and individual dwellings. Noise emissions from operations at the facilities are therefore considered likely to be of low significance.

10.10 Cultural Heritage

This section discusses potential impacts on cultural heritage sites during construction of the proposed Project design updates and associated mitigation measures to be adopted.

The Gobustan Rock Art Cultural Landscape (UNESCO World Heritage site) is an internationally important site. As discussed in Section 7.10, due to the distance between the site and the proposed Project area (approximately 12km at the nearest point), no impacts are predicted, and as such it has not been considered further within this section.

10.10.1 Aspects of the Project Design Updates that Could Affect Cultural Heritage

The following planned Project activities could affect cultural heritage in the project area:

- The removal of topsoil and subsoil during preparation of the ROW access roads and the pigging station
- Construction and grading of access roads
- Trench excavation in the ROW
- Excavation of foundations at the pigging station
- Movement of heavy vehicles and equipment.

Commissioning or operation of the completed SCPX Project is not expected to affect cultural heritage.

10.10.2 Key Sensitivities

One of the advantages of the proposed route largely following the earlier BTC and SCP route is that areas of potential difficulty are recognised and can be avoided at an early stage of design.

Few surface indications of archaeological features are known in the vicinity of the proposed additional section of pipeline and nothing was observed during BTC and SCP construction, so it appears that this is an area with a low probability for the presence of archaeological features. However, there is potential that features may be exposed during construction activities as was demonstrated in the BTC and SCP projects.

10.10.3 Impacts on Cultural Heritage

Activities associated with the construction of a pipeline and facilities may affect the archaeological record by physically damaging part or all of an archaeological site or historic monument. However, if the site is properly excavated and recorded the information obtained can be studied by future generations and will add to the general understanding of the history of the area. The generic impacts of construction on cultural heritage are discussed further in Section 10.10.3 of the SCPX Final ESIA which should be referred to for more information.

The significance of the general impacts of the proposed Project design updates on cultural heritage have been reviewed and are assessed not to have changed from those in Table 10-21 of the SCPX Final ESIA, which should be referred to for this information.
Table 10-11 determines the consequence or severity of likely impacts on the sites identified in Chapter 7, Section 7.10 using the methodology described in Section 10.10.3 of the SCPX Final ESIA.

Please note that the location of access roads (new and existing) to be used by traffic during the construction phase has yet to be determined fully, so potential Project impacts of noise and vibration from heavy vehicle movements on sites of cultural heritage importance cannot be assessed in detail at this stage. However, such impacts would occur only if the site was vulnerable to such damage, in very close proximity to Project vehicles and where the Project would substantially increase existing traffic levels.

**Table 10-11: Potential Impacts on Cultural Heritage at Specific Locations and/or Receptors**

<table>
<thead>
<tr>
<th>Location</th>
<th>KP</th>
<th>Sensitive Cultural Heritage</th>
<th>Potential Impacts</th>
<th>Potential Impact Significance*</th>
<th>Mitigation</th>
<th>Residual Impact Significance*</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH133</td>
<td>KP0</td>
<td>Transhumant settlement</td>
<td>Loss or disturbance of archaeology during upgrade of access road to the pigging station</td>
<td>A1 Low</td>
<td>27-05, 27-06</td>
<td>A1 Low</td>
</tr>
<tr>
<td>CH135</td>
<td>21.5</td>
<td>Transhumant settlement</td>
<td>Loss or disturbance of archaeology</td>
<td>A1 Low</td>
<td>27-05, 27-06</td>
<td>A1 Low</td>
</tr>
<tr>
<td>CH136</td>
<td>25</td>
<td>Transhumant settlement</td>
<td>Loss or disturbance of archaeology</td>
<td>A1 Low</td>
<td>27-05, 27-06</td>
<td>A1 Low</td>
</tr>
<tr>
<td>CH137</td>
<td>26.3</td>
<td>Possible features seen on aerial photograph (of recent possibly military origin)</td>
<td>Loss or disturbance of archaeology</td>
<td>A- Low</td>
<td>27-05, 27-06</td>
<td>A1 Low</td>
</tr>
<tr>
<td>CH138</td>
<td>27.6</td>
<td>Transhumant settlement</td>
<td>Loss or disturbance of archaeology</td>
<td>A- Low</td>
<td>27-05, 27-06</td>
<td>A1 Low</td>
</tr>
<tr>
<td>CH139</td>
<td>30.5</td>
<td>Transhumant settlement</td>
<td>Loss or disturbance of archaeology</td>
<td>A- Low</td>
<td>27-05, 27-06</td>
<td>A1 Low</td>
</tr>
</tbody>
</table>

* assessed using Tables 3-17 and 3-18

**10.10.4 Mitigation**

For details of the SCPX Project Cultural Heritage Management Plan (CHMP), please refer to Section 10.10.4 and Appendix D of the SCPX ESIA. The same approach and the same mitigation measures will be applied to the Project design updates.

**10.10.4.1 At the design stage**

While cultural heritage baseline data are a key input to Project design, no design changes or modifications to the proposed pipeline routes have occurred as a direct result of cultural heritage concerns. To date, no important archaeological sites have been confirmed within the additional sections of pipeline.
10.10.4.2  

**Pre-construction phase**  
A Cultural Heritage Management Plan will be implemented that includes the five-phase strategy for the progressive assessment and mitigation of the effects of construction (27-01). Areas of potential cultural heritage impact will be examined and any necessary excavations conducted prior to construction (27-02). The Cultural Heritage Management Plan is described in more detail in the “Preconstruction” sub-section of the SCPX Final ESIA Section 10.10.4 and will also be applied to the additional sections of pipeline.

10.10.4.3  

**Construction phase**  
Despite undertaking baseline and additional studies, surveys and trial excavations within the area of Project impact, the possibility of unearthing previously unknown archaeological artefacts and materials during topsoil stripping, grading or trenching and other earthmoving activities cannot be precluded. Therefore, a programme of archaeological surveillance (watching brief) monitoring will be implemented during construction. This is described in detail in the “Construction” sub-section of the SCPX Final ESIA Section 10.10.4 along with the measures to be taken in the event of a chance find including excavation and recovery of the features. These measures will apply to the construction of the additional sections of pipeline and the additional area to be taken at the pigging station.

Site CH137, possible features seen on an aerial photograph, will be examined closely on the ground to determine the origin of the features and determine if there will be an impact.

10.10.4.4  

**In the operation phase**  
As described in the SCPX Final ESIA, activities involving topsoil stripping and excavation during operation, which are undertaken outside of areas previously disturbed during Project construction, will be subject to a cultural heritage assessment to determine appropriate mitigation measures before the work begins (OP139). This will also apply to the additional sections of pipeline.

10.10.5  

**Residual Impacts**  
The proposed additional section of pipeline does not affect any known sites, so the residual impacts on known sites is predicted to be low.

There remains the potential to impact previously unknown sites. It is not possible for the Project to cross an archaeological site without some degree of impact. There are techniques that can reduce the degree of physical impact, such as reduced working width or protective surfaces to reduce damage from vehicle passage, although an impact will still be recorded. Archaeological excavation and recording to modern standards can also assist in mitigating this impact.

The SCPX Project has already added new information to the archaeological record of the area during the Phase 1 activities and will continue to do so during the remainder of the cultural heritage protection programme outlined in the CHMP. This is expected to generate beneficial effects including an increased understanding and awareness of Azerbaijan’s past and short term training and employment associated with Project archaeological studies and construction monitoring.

10.11  

**Demographics**  
Although the physical footprint resulting from the Project design updates is different the generic potential demographic impacts of the construction and operational phases are considered to be similar to those described in the Section 10.11.3 of the SCPX Final ESIA i.e. a potential reduction in out-migration from PACs and unplanned in-migration into communities close to the Project from individuals/families/households seeking economic opportunities. Reference should be made to Section 10.11.3 of the SCPX Final ESIA for more information.
There are also no site-specific features/sensitivities that warrant changing the description of impacts for both construction and operational phases as the specific features/sensitivities identified for Hajigabul, Ranjbar, Pirsaat and Goltug are present in other PACs.

10.11.1 Mitigation of Impacts

The generic mitigation measures from the SCPX Final ESIA will be applied to the proposed Project design updates. These mitigations are generally focused on the implementation and publication of the Project’s local recruitment strategy and implementing recruitment procedures which are transparent and open with preferential recruitment of unskilled and semi-skilled labour from local communities. Reference should be made to Section 10.11.4 and Appendix E of the SCPX Final ESIA for a full description of the mitigation measures.

10.11.2 Residual Impacts

The residual impact of the proposed Project design updates is the same as those described in Section 10.11.5 of the SCPX Final ESIA. Essentially, while there is a potential for unplanned in-migration to occur, the implementation of the proposed mitigation measures will help ensure that the number of in-migrants will be limited; thus, the residual impact is considered to be of low significance.

It is not expected that there will be any significant secondary impacts from unplanned in-migration on:

- The housing market in relation to property purchase and rental costs
- Competition for jobs with local people resulting in increased social tensions
- Local infrastructure capacities.

10.12 Community Health, Safety and Security

This section presents potential impacts on community health, safety and security during construction and operation of the Project design updates and associated mitigation measures to be adopted. This section has been written based not only on the socio-economic baseline (and key trends), but also on the results of a review of the mitigation measures from the health impact assessment (HIA), which was carried out in close cooperation with the SCPX Final ESIA.

The key community safety and health impacts (those with an unmitigated impact of low and above) identified by the HIA are summarised and discussed in this ESIA report with mitigation measures that will be applied. These mitigations are included in the commitments register in Appendix E.

This summary is not intended to replace the HIA, but presents its results and also highlights the connections between environmental and social impacts/mitigations and community health and safety impacts/mitigations such that relevant mitigations are included in the ESMMP (see Appendix D) and carried forward into the execution phase of the Project.

The identification of potential impacts was approached by reviewing the Project-Place-PAC within the context of available baseline data and a set of defined environmental health areas (EHAs). EHAs are a standard set of health effects categories that has been developed by the oil and gas industry and international multilateral lending institutions (IPIECA, 2005; IFC, 2008). The EHA approach includes all of the biomedical and social concerns originally developed by WHO and World Bank Group. Table 3-25 in Chapter 3 describes the EHAs in detail.
10.12.1 Aspects of the Project Design Updates that Could Affect Community Health, Safety and Security

10.12.1.1 Community health

The main activities associated with the Project design updates in common with the rest of the SCPX Project activities that may result in impacts to community health are:

- Introduction of non-local workers, almost entirely males, to certain localities
- Provision of construction camps for these workers with operating rules that allow for interaction between workers and local people
- Storage and handling of food and drinks in accommodation/camps
- Solid and liquid waste disposal.

10.12.1.2 Community safety and security

The following activities associated with the Project design updates, in common with the rest of the SCPX Project, may result in impacts to community safety and security:

- Trench excavation
- Road widening, upgrading or maintenance with use of vehicles unfamiliar to local people
- Road widening, upgrading and maintenance resulting in temporary creation of ditches, borrow pits, spoil heaps and other hazardous changes to ground surface conditions
- Increased vehicle movements, especially heavy goods vehicles and small light utility vehicles
- Presence of pipeline laying equipment unfamiliar to local people
- Creation of open excavated areas such as trenches
- Accidental spillages of chemicals
- Use of equipment that generates noise on the ROW and pigging station (for example, compressors and generators).

The above activities are confined primarily to the construction and commissioning phase with limited (if any) impacts predicted during the operations phase. No site-specific impacts on community health have been identified due to the Project design updates.

10.12.2 Key Sensitivities

The key sensitivities related to the proposed Project design updates are very similar to those described in Section 10.12.2 of the SCPX Final ESIA. They are briefly summarised below – please refer to Section 10.12.2 of the SCPX Final ESIA for the full text.

10.12.2.1 Community health

Key sensitivities are:

- High tuberculosis (TB) rates and the prevalence of multi-drug resistant TB
- High prevalence of infections of the ear, throat, and nose (including influenza and colds), in the PACs indicative of a significant underlying baseline burden of respiratory infection
- New and emerging infectious diseases such as avian influenza
- Vector and zoonotic-related diseases such as rabies, brucellosis, leishmaniasis, tularemia, *Yersinia pestis*, tuberculosis and malaria are endemic
- Increasing rates of sexually transmitted infections (STIs) such as HIV/AIDs
- Lack of sewage systems in most PACs
• Lack of water supply inside most PAC households and reduced accessibility to safe drinking water
• Reduction in affordability of medicines for many PAC residents. Also, ease of access is a key problem.

10.12.2.2 Community safety and security
The key sensitivities are:

• Increase in road traffic injuries and deaths
• Some residents, especially children, may not understand the hazards and risks and how to avoid injury
• Cultural attitudes to risk taking
• Cultural attitudes of residents and other people in vicinity of project sites to non-local security personnel imposing restrictions on their normal ‘day-to-day’ activities.

10.12.3 Potential Impacts on Community Health, Safety and Security

10.12.3.1 Community health
Potential impacts remain as described in the Section 10.12.3 of the SCPX Final ESIA and include:

• Changes to air quality/potential increase in respiratory diseases
• Disturbance to sleep patterns (assessed in Section 10.9)
• Potential increase in disease vectors
• Potential increased incidence in cases of communicable diseases
• Potential increased incidence of water-borne diseases.

Reference should be made to the corresponding section of the SCPX Final ESIA for a more detailed description.

10.12.3.2 Community safety and security
Potential impacts remain as described in the Section 10.12.3 of the SCPX Final ESIA and include:

• Increased hazards (e.g. open excavations and open trenches) and increased risk of accidents causing injuries or fatalities
• Increased risk of road/traffic accidents causing injuries or fatalities
• Potential conflict between security personnel and local community members and community members and foreign workers.

10.12.3.3 Impact summary and assessment of significance
Tables 10-25 and 10-26 of the SCPX Final ESIA provided an assessment of the significance of potential impacts on community health, safety and security before and after implementation of the proposed mitigation measures. The significance of the impacts of the proposed Project design changes have been reviewed and found to be the same so the tables are not repeated here.

10.12.4 Mitigation
The relevant generic mitigation measures from the SCPX Final ESIA will be applied to the proposed Project design updates. These mitigations are generally focused on:

• Consultation and raising of community Health and Safety awareness
• Using barriers and signs at areas including road crossings or where the ROW passes close to communities
Controlling the length of open trench

Project speed limits, use of temporary flagmen, driver training and controls on movements of heavy vehicles

Health checks coupled with health awareness raising, vector control and stringent food/drink hygiene and solid/liquid waste management.

Reference should be made to Section 10.12.4 and Appendix E of the SCPX Final ESIA for a full description of the mitigation measures.

### 10.12.5 Residual Impacts

In the SCPX Final ESIA, accidents at the worksite, road traffic accidents (and the possibility that a patient’s condition could deteriorate if their journey to a medical facility was delayed) were assessed to result in residual impacts of high significance although the proposed mitigation measures would cause a decrease in the probability of such an event occurring. The residual impacts of the Project design updates will be similar, even though the Project design updates reduce in the number of journeys required for pipe transport.

Effective implementation of the proposed mitigation measures is likely to reduce the significance of other impacts on community health and safety to medium or low levels and decrease the probability that such events will occur.

### 10.13 Land

This section discusses potential impacts on land, including land ownership, land use and land-related livelihoods, during construction and operation of the Project design updates, as well as associated impact minimisation, avoidance and compensation measures. Further details are provided in the specific land acquisition planning document developed for SCPX (“Land Acquisition and Compensation Framework” or “LACF”, and “Guide to Land Acquisition and Compensation” or “GLAC”), which should also be referred to, and take precedence in the event of any discrepancy.

#### 10.13.1 Aspects of SCPX Project that Could Affect Land Ownership, Land Use and Livelihoods

The SCPX construction corridor remains at a standard width of 36m with some sections where the right of way is increased to 41m to accommodate difficult working areas, as described in Section 5.4.4, and the general approach to land acquisition remains as outlined in Section 5.4.7 of the SCPX Final ESIA and in the Land Acquisition and Compensation Framework (LACF). As mentioned in the SCPX Final ESIA, extra-width may locally be required to accommodate river and other crossings, as well as some specific construction constraints including steep slopes and areas where construction requires blasting or other specific technologies.

In Azerbaijan, the following Project activities can potentially affect land ownership, land use and livelihoods in Project-Affected Communities:

- The construction, commissioning and operation of the new pipeline starting at SCP KP23 (SCPX KP0) at the tie-in facility and continuing to the border with Georgia (SCPX KP412) and beyond into Georgia. The pipeline is routed parallel to the existing SCP and BTC pipelines for most of its length.
- The construction, commissioning and operation of the permanent tie in and pigging station at SCP KP23 near the small settlement of Goltug in Gobustan District. The surface area of this Above Ground Installation (including a vent area) is about 1.5 hectare.
These types of facilities entail different modalities of land access and different types and durations of impacts as a result:

- Land for the pipeline construction (pipeline corridor) will be leased by the Project from its current owners (either private landowners where land is currently in private ownership or municipal executive committees where land is in municipal ownership). Land servitude agreements will be made for a 60 year period to cover access along the 8m strip centred over the pipeline and re-use restrictions on the 30m protection strip. Leases will be for the duration of construction (a likely maximum of three years). Land will remain in landowners’ ownership and will be reinstated after construction is complete. Upon completion of construction and reinstatement, land will be handed back to its owners for agricultural or other use, subject to re-use restrictions (prohibition of any buildings, deep ploughing and plantation of trees with deep roots within an 8m-wide strip centred on the pipeline, and the prohibition of buildings within a 30m-wide strip centred on the pipeline)

- Land designated for construction and operation of permanent facilities will be acquired on a permanent basis from its current owners.

In addition, the following potential impacts may occur during construction:

- Temporary disruption to herd movements due to construction activities (particularly the temporary presence of the pipeline trench and associated activities and equipment, which may cause severance); this is also addressed elsewhere in this document, and related mitigations are described, amongst others, in Section 10.11.

- Temporary disruption to irrigation and drainage due to interruption of networks as a result of construction activities, and associated losses of crops

- Severance of access to cultivated plots during construction, impeding farmers’ access to a plot and resulting in total or partial loss of crop

- Damages to crops in plots neighbouring the pipeline construction corridor due to, for example, spill over of earth or intrusion of equipment.

During operations, the most likely potential impact would be damages to crops in the pipeline corridor or nearby resulting from maintenance activities or vehicular access.

Compensation principles for all land acquisition activities are presented in the LACF and the associated GLAC.

### 10.13.2 Key Sensitivities

From a land use perspective, four zones have been distinguished along the pipeline route (see further details in Chapter 8):

- KP0 to KP 2.5 (including the new location of the tie-in and pigging station and starting point of the additional pipeline section at KP0): the land is generally flat and arid and there is no agricultural activity. This area can be used as winter pasture by local sheep breeders. It is State-owned land

- KP 2.5 to KP 6: the route follows a ridge in an area of undulated terrain. There is no agricultural use, but the area is likely to be used for low intensity, occasional sheep grazing, similar to the previous area

- KP6 to KP19: this is a flat agricultural area, with irrigation channels and drains crossing the corridor. Land parcels are relatively large and well delineated by ditches or canals. Crops include cotton, wheat, and fodder crops. Land is privately owned
KP19 to KP 34: the SCPX route intersects semi-arid land, potentially used as temporary grazing land during winter by herds of sheep and goats. Land is likely to be State or municipally owned.

Key sensitivities are the following:
- Semi-arid land used as temporary pasture (zones 1, 2 and 4 above):
  - Access of herds to water points and grazing areas, which may be temporarily impeded by construction activities.
  - Small permanent land take for the tie-in and pigging station.
- Agricultural irrigated land (zone 3 above):
  - Temporary loss of livelihoods for farmers (whether landowners or land users) affected during the construction period.

10.13.3 Impacts on Landowners and Users
Section 10.13.1 of the main ESIA describes impacts on livelihoods and is briefly summarised here. No specific impacts on livelihoods have been identified for the section of pipeline subject to this addendum as similar areas are also crossed by the section subject to the main ESIA: therefore, the generic description presented in Section 10.13.1 of the main ESIA applies. The assessment of key impacts is briefly summarised below.

10.13.3.1 Pipeline – Construction phase
Private land can be a significant resource for rural PACs as many inhabitants engage in some degree of agriculture and the products obtained from agriculture are important to livelihoods (food for own use and sale of surplus). State land is used for pasture and extensive livestock rearing is the only agricultural activity that is possible in large parts of the area intersected by this section of pipeline (see above, zones 1, 2 and 4, i.e. about 60% of the length of the section covered in this Addendum).

Potential impacts on livelihoods associated with the construction period (a maximum of three years) are related to the following:
- Temporary restrictions to livestock movements
- Temporary loss of crops and associated reduction in income or means of subsistence
- Temporary severance of access to agricultural plots
- Temporary disruption to irrigation and drainage due to interruption of networks as a result of construction activities, and associated losses of crops.

10.13.3.2 Pipeline – Operations phase
Experience indicates that impacts to livelihoods of the restrictions on land use in the pipeline right of way (ROW) are likely to be negligible.

Agricultural land:
Restrictions do not preclude agricultural activities and only affect activities such as erecting structures, growing certain kinds of deep-rooted trees, and major earth moving. It is noted that there are currently very few fruit or other trees in the area intersected by this section. Open field agriculture of the type conducted in this section (with crops such as cotton, wheat, or various fodder crops) is not affected by the restrictions beyond the construction period. Subject to proper reinstatement, vegetation growth is expected to recover to its former levels within approximately one to three years after construction. Farmers have continued agricultural activities successfully along the existing WREP, BTC and SCP pipelines. There may be some additional damages to crops in the pipeline corridor or nearby resulting from maintenance activities or vehicular access. Overall, impacts to agricultural livelihoods beyond the construction period are negligible.
Pasture land:
Reinstatement of pasture land in an arid climate and in fragile, erodible soils such as the ones intersected by this section can be more problematic, and typically takes more time. However, BP’s reinstatement experience in similar soils for the BTC and SCP pipeline indicates that reasonable grazing conditions, if not full pasture productivity\(^4\), can be reinstated within three to five years, depending on the rainfall and slope. In addition, this potential adverse impact must be seen in the perspective of the very small footprint of the pipeline corridor (about 80 hectares in arid land) within the whole area available for grazing. As a result, impacts to livestock based livelihoods beyond the construction period are very low.

10.13.3.3 Aboveground installations – construction and operations phases
Permanent acquisition of land for the tie-in and pigging station could result in the following potential impacts:

- Impact to livelihoods associated to the permanent loss of grazing land
- Severance and loss of access to neighbouring, unaffected land parcels.

10.13.4 Mitigation of Impacts

10.13.4.1 Compensation
Key compensation principles applied for the SCPX project in Azerbaijan are the following: (see further details in the LACF – the number of the relevant commitment in the LACF is mentioned below):

- Land acquisition for SCPX shall be carried out in compliance with Azerbaijan law and will be guided by international requirements (IFC PS 5)\(^{(LACF01)}\)
- Current market value shall be used for the calculation of any land and crop compensation\(^{(LACF03)}\)
- Land required on a permanent basis for Above Ground Installations will be purchased from its current owners. Ownership of such land will be transferred to the State of Azerbaijan, which will enter in a lease agreement with SCP Co. per the Host Government Agreement\(^{(LACF04)}\)
- The pipeline Construction Corridor will be used by SCP Co for the duration of the construction, i.e. for a maximum of three years:
  - Land in the pipeline Construction Corridor will not be acquired by SCP Co but will be leased for three years from its current owners and handed back to these owners with some restrictions after end of construction and reinstatement\(^{(LACF05)}\)
  - Any standing crops in the pipeline Construction Corridor will be compensated at current market value\(^{(LACF06)}\)
  - Restrictions on land reuse during operations will be compensated to affected landowners\(^{(LACF07)}\)
- Orphan land, i.e. land that is severed or bisected such that a non-acquired portion of the land plot is made uneconomic and/or unviable, will be compensated\(^{(LACF09)}\)
- The process of land access, including land acquisition and land leases, will be administered by joint Land Acquisition Teams involving both representatives of the Government of Azerbaijan and SCP Co.\(^{(LACF10)}\). These teams will seek to enter into negotiated settlements with affected landowners and land users wherever possible\(^{(LACF11)}\). Where no agreement can be reached, Land Acquisition Teams

\(^4\) Which, by any means, remains very low in such arid conditions, thereby requiring extremely low animal loads per hectare, and seasonal use only, which allows for some natural reinstatement of pasture productivity.
will be able to resort to compulsory acquisition for State needs. Amongst others, this may apply in situations where the whereabouts of the landowner or land user are unknown (absentee landowners)

- Affected people will have access to a grievance mechanism, including a first tier of internal grievance review by SCP Co., with the possibility for aggrieved individuals to resort to a second tier of independent review of the grievance (LACF12).

- Vulnerable people will be identified and specifically assisted as needed (LACF13).

- Compensation for permanently acquired land will include the following three elements, as applicable:
  - Compensation for land at the Project Land Rate, plus a 20% bonus to comply with the 2007 Presidential Decree (see 3.1.6).
  - Compensation at replacement value for any structures or developments on land that the land owner or land user can demonstrate ownership of.
  - Compensation for any standing annual or perennial crops at the Project Crop Rate (LACF16).

- Compensation for the Pipeline Corridor will include the following elements, as applicable:
  - Land rental: A rental fee calculated to compensate for the loss of agricultural production for the three year maximal duration of construction. The rental fee will be calculated based on the full season agricultural income expected in the area for the typical agricultural rotation, multiplied by three years.
  - Livelihood restoration: An additional compensation meant to compensate for any loss of agricultural productivity after reinstatement, which will be calculated as 30% of the full season agricultural income expected in the area for the typical agricultural rotation, multiplied by three years.
  - Crops: Compensation for any standing annual or perennial crops at the Project Crop Rate.
  - Restrictions: Compensation for restrictions as follows:
    - Compensation for restricted re-use of the whole 36 m Construction Corridor: 20% of the Project Land Rate applied to the whole 36 m width.
    - Compensation for potential access to the 8 m strip for maintenance or emergencies: 55% of the Project Land Rate applied to the 8 m strip (LACF19).

- SCP Co. will reinstate the Pipeline Corridor at the end of construction to its previous condition, such that pre-construction agricultural productivity will be restored within a period of three years after the end of construction. Reinstatement will include the re-establishment to a condition and functionality better or similar to the pre-construction condition of any irrigation and/or drainage structure that may need to be demolished, modified or interrupted during construction (LACF18).

- The team will meet with the landowners/users to explain the process on an individual basis and will physically visit the affected plot in the presence of the affected landowner and/or land user to carry out a detailed inventory and inspection of the land, development and enhancements, and crops on the affected parcel of land (LACF33).

- All compensation will be based on replacement value (LACF36).

10.13.4.2 Accidents to livestock

Proposed mitigation measures intended to reduce the risk of accidents to livestock follow:

- The length of the continuous open trench (including trench with pipe installed but not backfilled and with a void space greater than 1m) will not exceed 10km per
spread and the maximum length of the open trench will not exceed 15km per
spread (21-01)

• Each section of open pipeline trench will have sloped ends or other mechanisms to
aid egress from the trench (21-02).

10.13.4.3 Disruption of movement of people and herds
The mitigation measures proposed to be adopted are the following:

• Gaps will be left in soil stacks at strategic locations to allow passage of animals and
people where the Project considers it safe to do so (20-01)

• Gaps will be left in pipe strings where safe to do so and necessary to allow people,
wildlife and livestock to cross the ROW (32-08).

10.13.4.4 Impeded or severed access to a plot or land
The following mitigation measures will be adopted with the aim of ensuring that landowners
and users are not impeded from accessing their land:

• The Project will consult with local government authorities, landowners and land
users, including graziers, before restricting access to land and will establish the
need for temporary fencing (32-01)

• Land users and local communities will be consulted to determine their requirements
for access across the RoW during construction (33-19)

• The Project will seek to identify whether any herders use the construction areas and
to inform them of potential restrictions during construction (32-17)

• The Project will provide a substitute for watering holes used by livestock that cannot
be used due to Project-related actions. The substitute will be of a type, and in a
location, to be agreed with representatives of the livestock owners and herders (32-
04)

• If small remaining plot parts are made uneconomic as a result of the purchase or
occupation, they may be eligible to compensation as “orphan land” subject to
conditions \(LACF24\).

10.13.4.5 Temporary disruption of irrigation or drainage causing loss of agricultural
production
The following mitigation measures are proposed to reduce the potential for the impacts to
occur:

• Surveys of irrigation and drainage systems will be undertaken before construction to
determine their location and condition (35-05)

• The Contractor will aim to maintain the integrity and viability of functional irrigation
and drainage systems throughout construction, for example, by using measures
such as pumping, channel diversions and fluming (35-06)

• Affected landowners and occupiers will be consulted on the need for temporary
measures if irrigation systems are to be disrupted (35-07)

• Any disrupted irrigation or drainage system will be reinstated on completion of
construction to a standard at least equal to their original condition (35-08). The land
drainage system will be reinstated to achieve pre-existing functionality (16-01)

• If impacts to third party land or crops is caused by Project activity, for example due
to interruption of irrigation or drainage, the Project's procedure for land and crop
damage apply (36-03).

10.13.4.6 Loss of field boundaries
• Any field boundaries that are removed will be replaced with temporary fencing to
meet reasonable landowner/user requirements (34-01)
• Field boundaries will be reinstated to pre-existing condition on completion of construction (3-19).

10.13.4.7 Construction phase: permanent facilities
Land affected by the tie-in and pigging station at KP0 and the block valves will either be purchased from the relevant landowner (either the State or a municipal authority) or rented on a long-term lease basis.

Compensation and mitigation measures proposed previously will apply to the temporary facilities.

10.13.4.8 Grievance management
Affected landowners and land users will be able to express grievances about project-related activities. A grievance register will be used to document all third party grievances, corrective actions and outcomes (33-13). The grievance management and redress mechanism will include one tier of internal review and resolution, and another tier of independent redress that can be triggered where internal efforts have failed to provide a mutually agreeable settlement. The mechanism is described in details in the LACF.

Avenues to lodge grievances are communicated broadly to affected people, specifically through the Guide to Land Acquisition and Compensation that is being disseminated to all relevant local authorities and all affected land owners and land users.

10.13.4.9 Monitoring
The mitigation and compensation process will be monitored as follows:

• Internal progress and performance monitoring (a number of key performance indicators are defined in the LACF)
• External outcome evaluation
• Completion audit, in line with IFC PS5.

Details on monitoring of the compensation and livelihood restoration process are provided in the LACF.

10.13.4.10 In the operations phase
The following mitigation measures are proposed to be adopted in the operational phase of the Project:

• The project will inform land owners/users about any reuse restrictions that apply to land used by the project (32-07)
• Operations will liaise with the government authorities to establish guidelines regarding patrol behaviour with respect to access to/transit through agricultural lands and the reporting of any damage (OP25)
• The project will maintain liaison with all land owners along the pipeline route, and with authorities and utilities companies to track proposals for third party buildings activities that could affect the pipeline (OP133).

10.13.5 Residual impacts
Levels of compensation will be such that livelihoods are maintained at levels prior to land acquisition if not improved. With implementation of the proposed mitigation measures residual impacts of land acquisition on land-based livelihoods are considered likely to be of low or negligible significance.

Monitoring will be undertaken to allow identification of situations of non-compliances with the mitigations. Landowners and users will have opportunities and avenues to raise specific
concerns through a grievance mechanism so that they can be addressed by the construction contractor and the Project.

10.14 Economy, Employment, Skills and Livelihoods

This section presents potential impacts on the local/regional economies, employment, skills and livelihoods of the Project design updates and associated mitigation measures to be adopted.

The livelihood impacts discussed in this section refer to non-land based livelihoods only. Impacts on landowners and land users are covered in Section 10.13.

10.14.1 Aspects of the Project Design Updates that Could Affect the Economy, Employment, Skills and Livelihoods

The Project design updates will, in concert with the rest of the SCPX project, provide opportunities for companies at the national, and possibly regional, level to supply goods and services. These activities are expected to affect the local economies, employment, skills and livelihoods primarily by:

• Employing local people temporarily to carry out construction work on the pipeline, and at the Facilities. It will also employ permanent staff to operate and maintain the Facilities
• Local purchases of goods and services directly by contractors and workers
• Causing potential in-migration of individuals/households to take advantage of economic opportunities created by the Project design updates.

Other activities associated with the Project design updates that have the potential to affect livelihoods are:

• Atmospheric emissions (especially dust) that cause a decline in crop productivity
• Land take – (this activity is discussed in Section 10.13)
• Periodic security patrols either on foot or on horseback along the pipeline route damaging crops or disturbing livestock.

10.14.2 Key Sensitivities

Key employment and livelihood sensitivities are identical to those presented in Section 10.14.2 of the SCPX Final ESIA, namely:

• Unemployment levels in the PACs are higher than the national average
• Lack of education and skills
• Local waged employment opportunities are limited and people work in the agricultural sector. As agriculture is the main source of livelihood, providing most employment then workers in the agricultural sector are sensitive to any impacts to their ability to undertake agricultural activities.

The key economic sensitivities, also, are similar and include:

• Average monthly income is approximately 26% below the national average
• Insufficient income for basic needs. Approximately 30% of households state that their income has decreased over the past five years
• Access to business loans is difficult.
10.14.3 Impacts on Economy, Employment, Skills and Livelihoods

The physical footprint resulting from the Project design updates is different to the footprint considered in the SCPX Final ESIA. However, the generic potential impacts of construction and operational phases on local economies, employment and skills and livelihoods are similar to those described in Section 10.14.3 of the SCPX Final ESIA and summarised below.

The following beneficial impacts may occur:

- Increase in available jobs and incomes
- Improved standard of living for households with members who have increased incomes due to employment of local people
- Enhanced skills among local workforce.

Adverse impacts may include:

- Un-met employment expectations
- Resentment between local people who are employed by the Project and those whose applications were unsuccessful or if local workers perceive that foreign workers are receiving better pay or conditions for exactly the same job
- Increased inflation, particularly of food and housing costs
- Accidents to livestock resulting in loss of income/adverse livelihood impact
- Retrenchment leading to significant numbers of individuals from certain PACs losing jobs at the same time.

The scale of the impacts will be considerably smaller, for the Project design updates, and the distribution of the impacts will be altered. For example, some residents at the PACs near the PRMS may be affected more by land take than previously. Also, the residents of Hajigabul, Ranjbar and Pirsaat may find it easier, than other PAC residents to gain employment and benefit economically, in other ways (such as selling local agricultural produce to the workers), due to their relatively close proximity to construction activities. The residents of Goltug are herders and they are less likely to wish to be employed as livestock herding is almost a 24/7 specialist occupation (with limited access to replacement workers, unlike the case for crop production).

There are no specific features/sensitivities that warrant changing the description of impacts for both construction and operational phases.

10.14.3.1 Impact summary and assessment of significance

The SCPX Final ESIA Table 10-39 provides an assessment of the significance of impacts on economy, employment, skills and livelihoods before and after implementation of the proposed mitigation measures. The significance of the impacts of the proposed Project design changes have been reviewed and found to be the same so the table is not repeated here.

10.14.4 Mitigation of Impacts on Economy, Employment, Skills and Livelihoods

The generic mitigation measures from the SCPX Final ESIA will be applied to the proposed Project design updates. These measures are focused on the following key issues:

- Implementation and publication of the Project’s local recruitment strategy
- Preferentially recruiting unskilled labour from local communities
- Including environmental and social (cultural) issues in workforce training
- Procurement of local goods and services where appropriate
• Consultation and use of a grievance procedure.

Reference should be made to Section 10.14.4 and Appendix E of the SCPX Final ESIA for a full description of the mitigation measures.

10.14.5 Residual Impacts

The residual impacts of the Project design updates will be the same as those for the SCPX Project as a whole. These are summarised briefly below and are described in more detail in Section 10.14.5 of the SCPX Final ESIA:

• Overall the SCPX Project is expected to bring economic benefits to local communities
• Retrenchment will occur where many will lose their jobs in a short timescale.

Some small-scale economic disruption is likely to occur as small and medium enterprises and public sector organisations lose employees.

10.15 Infrastructure and Services

This section presents potential impacts on infrastructure and services, including roads, electricity lines, telephone lines and other pipelines, during construction and operation of the Project design updates and associated mitigation measures to be adopted.

10.15.1 Aspects of Project Design Updates that Could Affect Infrastructure and Services

The Project design updates will:

• Provide economic opportunities that may attract in-migrants, thus putting pressure on existing infrastructure and services, see Section 10.11 and Section 10.14
• Undertake earth-moving/excavation works that may inadvertently damage existing infrastructure, such as other pipelines, electricity lines and telephone cables
• Use existing utilities to supply some services
• Use existing roads for the transport of materials, equipment, plant and workers
• Construct a permanent access road to the pigging station
• Widen and upgrade existing access roads, where needed
• Construct new temporary access roads, where needed.

The following potential impacts on infrastructure are assessed elsewhere in Chapter 10. In particular, the Project will use roads, with the potential to create congestion and increase the risk of accidents, see Sections 10.12 and 10.16. The potential impacts of noise and vibration from construction traffic on buildings is addressed in Section 10.9.

10.15.2 Key Sensitivities

Apart from Goltug, the PACs are dependent on electricity and/or gas for cooking. Also, most residents have potable water and hot water in the households. These PACs would be sensitive to any works that required the supply of electricity or gas or water to be interrupted or which inadvertently caused outages or a diminution in the supply. Other key sensitivities include for Ranjbar, Pirsaat and for about 50% of households in Hajigabul:

• Solid waste disposal facilities unavailable.
• Lack of sewerage.
10.15.3 **Impacts on Infrastructure and Services**

Many of the main potential impacts during construction are similar to the general impacts of the rest of the SCPX project and are as follows:

- Disruption of utility supplies, if pipes or other services are disrupted as a direct result of damage caused by construction of the pipeline
- Infrastructure capacity exceeded with reduction in service quality and quantity to all other consumers
- Wear/degradation of road surface - by using local roads for access to the ROW, construction vehicles will cause wear of the surface. When roads are used frequently by heavy trucks, the surface may deform and ruts may be caused. Where heavy over-sized loads are transported, the weight may cause cracks to appear in bridges and support structures
- Traffic congestion and delays, particularly during movement of long or heavy loads, although it should be noted that the roads to be used in both sections are not congested and the impacts of this are therefore predicted to be low.

No site-specific impacts have been identified. For example, the additional sections of pipeline are not likely to significantly affect access to any dwellings.

10.15.3.1 **Impact summary and assessment of significance**

The significance of the impacts of the Project design updates on infrastructure and services (including roads) before and after implementation of the proposed mitigation measures has been reviewed and are assessed be unchanged from those in Table 10-40 of the SCPX Final ESIA. This table, therefore, should be referred to for this information.

10.15.4 **Mitigation of Impacts on Infrastructure and Services**

The generic mitigation measures from the SCPX Final ESIA will be applied to the Project design updates. These mitigations are focused on:

- Communicating any disruption to services to users in advance
- Repairing damage within a reasonable time
- Selection, use and repair of access roads.

Reference should be made to Section 10.15.4 and Appendix E of the SCPX Final ESIA for a full description of the mitigation measures.

10.15.5 **Residual Impacts**

Unplanned damage or disruption to infrastructure and utility services will reduce in probability, but cannot be eliminated and the residual impact is of medium significance. The transport of oversize heavy loads of process equipment on public roads may cause some traffic road damage, of medium significance.

10.16 **Traffic and Transport**

This section covers potential impacts on traffic and transport during construction and operation of the proposed Project design updates and associated mitigation measures to be adopted. The impact of Project traffic on community safety is assessed in Section 10.12.
10.16.1 Aspects of SCPX Project that Could Affect Traffic and Transport

The following activities associated with the Project design updates, could affect traffic and transport in the Project area:

- Additional vehicle movements causing disturbance and inconvenience to other road users and increased threats to health and safety of local people (considered in Section 10.11)
- Disruption of traffic flows causing inconvenience to local users
- Transport of aggregate from quarries and borrow pits to the pigging station construction site and the pipeline ROW
- Transport of line pipe to the ROW
- Transport of equipment from rail heads to lay-down areas at the pigging station construction site
- Transport of workers to and from the ROW and other working areas.

The Project will aim to prioritise use of existing access roads, in particular those that were used for BTC and SCP construction and maximise the use of the ROW itself for movement of pipe and plant along the route. Depending on existing access to the ROW new temporary access roads may be installed to ensure that access is available approximately every 5km, with the exact location of access roads determined by consideration of local traffic flows.

Generally, the above impacts occur during construction with limited, if any, impacts during construction and commissioning.

10.16.2 Key Sensitivities

Key sensitivities with respect to traffic and transport along the proposed additional section of pipeline and at the pigging station are detailed below, following a traffic baseline survey which was undertaken in October 2013.

The east-west highway is a relatively wide tarmac road with minimal damage and existing traffic levels are within its carrying capacity.

The road at the survey location was a rural, unpaved and uneven road with extensive damage, i.e. potholes.

Other roads in the area were in variable condition (i.e. either paved or unpaved with different degrees of damage).

Pedestrians and animal flocks were observed walking directly on or across the road, which increases their vulnerability to accidents.

The public access road to the new pigging station is an unsurfaced track that will need surfacing and upgrading. From this road, existing field tracks lead to the pigging station. These will be surfaced and upgraded to provide all weather access to the station.

10.16.3 Impacts on Traffic and Transport

10.16.3.1 Proposed pipeline construction and commissioning, including pigging station

Additional traffic

Overall, the reduction in size of the pipeline will lead to an overall fall of 3,635 in the number of truck journeys needed to transport the pipe sections.
The Project design updates will generate additional road traffic during construction as a result of:

- Transporting the workforce to the ROW and pigging station construction site, from the construction camps each morning and back each evening, and, in the case of non-camp resident workers, from villages to the construction sites
- Transport of aggregate for pipe bedding and pigging station construction
- Transport of concrete for pigging station construction
- Transport of line pipe and large equipment from pipe storage areas to the ROW and the pigging station
- Transport of other materials, such as fuel, food, water, to the ROW including water for hydrostatic testing
- Transport of waste for off-site treatment or disposal – it is currently assumed that much of the waste will be transported back to Baku
- Transport of plant to the ROW; some of this traffic will also consist of low loaders.

Pipe delivery represents the majority of movements associated with the construction phase - it is anticipated that approximately 12,515 vehicle movements will be needed to transport the pipe. However, pipe storage areas have been chosen, where possible, to be adjacent to the ROW to minimise the need to transport pipe on public roads.

Approximately 6500 truck trips will be associated with moving aggregate from the extraction location to the point of use. An estimated 665 truck movements will be required to transport concrete to the pigging station. The estimated number of vehicles required to transport water for hydrotesting could result in approximately 4000 truck movements (trucks with a capacity of 20m³), which is for the entire pipeline within Azerbaijan. The number of truck movements associated with transporting hydrotest water from the Pirsaat alone is not yet known.

Additional vehicle movements could congest the flow of traffic causing delays and inconvenience to local road users. Increasing traffic flows on busy roads may also increase the risk of accidents affecting local people (see Section 10.12.3).

Traffic flows will also be disrupted if unusually wide or heavy loads are moved by vehicles travelling at slow speed.

On narrow roads used mainly by agricultural vehicles at slow speed that cause delay to other road users, the present of construction traffic may cause further delays to other road users.

**10.16.3.2 In the operations phase**

The impact on infrastructure is considered likely to be low, and thus no mitigation is considered during the operation stage.

**10.16.3.3 Impact summary and assessment of significance**

The significance of the generic impacts of the Project design updates have been reviewed and are assessed to be similar to those for the rest of the SCPX pipeline in Azerbaijan. Please therefore refer to Table 10-12 below for this information.
Table 10-12: Assessment of Impact of Traffic and Transport

<table>
<thead>
<tr>
<th>Issue</th>
<th>Potential Impacts</th>
<th>Potential Impact Significance*</th>
<th>Mitigation</th>
<th>Residual Impact Significance*</th>
</tr>
</thead>
<tbody>
<tr>
<td>A37</td>
<td>Use of local road network by construction traffic</td>
<td>A-C2 Low</td>
<td>30-24, 37-05, 37-11, 37-18, 33-14, D5-036, D5-055</td>
<td>A-C1 Low</td>
</tr>
<tr>
<td></td>
<td>Congestion leading to delays</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A38</td>
<td>Road closure</td>
<td>A-C2 Low</td>
<td>37-01, 37-02, 37-03, 37-14</td>
<td>A-C1 Low</td>
</tr>
<tr>
<td></td>
<td>Disruption of traffic flows causing inconvenience to local users</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Assessed using Tables 3-24 and 3-25

10.16.4 Mitigation of Impacts of Traffic and Transport

The general mitigation measures described in Section 10.16.4 and listed in Appendix E of the SCPX Final ESIA will be applied to the proposed Project design updates, where they are relevant, to reduce the risks associated with traffic and transport. They are therefore not repeated here in full to avoid repetition.

These mitigations are generally focussed on:

- Communicating any disruption to roads to local communities in advance
- Using traffic control measures and provision of alternative access
- Project speed limits
- Driver training.

Reference should be made to Section 10.16.4 and Appendix E of the SCPX Final ESIA for a full description of the mitigation measures.

10.16.5 Residual Impacts

If the proposed mitigation measures are implemented, the impacts on roads and road users are expected to be of low significance.