Chapter 10 Environmental and Social Impacts and Mitigations (Planned Activities)

TABLE OF CONTENTS

Tables

Figures

Photographs

10 ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION (PLANNED ACTIVITIES)

10.1 Introduction

This chapter describes the potential changes to the baseline environmental and social conditions that are considered most likely to be caused when the planned activities described in Chapter 5, Project Description, are carried out. It presents the findings of an assessment of the likely significance of those changes, applying the methodology that is presented in Chapter 3.

This chapter also discusses the mitigation measures that have been proposed with the aim of avoiding or minimising the SCPX Project's potential impacts or enhancing its potential beneficial effects.

This chapter does not describe or assess unplanned and accidental events which may occur during the Project's operational phase (e.g. pipeline rupture), which are discussed in Chapter 12, (Hazard Analysis and Risk Assessment). However, this chapter does describe and assess unplanned events that may occur during the construction phase such as spills and traffic accidents.

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 are presented in three tables in Appendix B to this ESIA:

- Table B-1 presents a matrix of **activities and environmental, social and cultural heritage issues** potentially associated with the proposed:
    - SCPX pipeline loop, including the pigging station and block valves (BVRs)
    - Construction camps, pipe storage areas, rail spur and offloading areas and associated access roads
    - Temporary access roads to the SCPX pipeline loop ROW (Right of Way)
    - Logistics associated with the Project.

  Shaded cells identify which issues are relevant to each construction, commissioning and operational activity. Each issue is numbered (A1 to A41) to aid traceability throughout this section and in the wider report
- Table B-2 presents likely **generic potential Project impacts** associated with each issue identified in Table B-1, and scores 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 relevant receptor and the magnitude of the potential impact. It outlines mitigation measures that are proposed with the aim of reducing adverse impacts or enhancing potential beneficial effects and then scores the likely residual impacts on the basis that the proposed the mitigation measures are implemented. A generic impact may occur either in several different places in the Project or in specific places that have not been defined to date (so that a specific location cannot be defined at the moment). A generic impact usually does not vary in significance according to where it occurs. Where this is thought likely to be the case, the range of variation is included in the significance assessment in Table B-2
- Table B-3 presents **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). The potential impacts on these

places are scored, mitigation measures are proposed and the likely 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 SCPX Project activities on various environmental and social components. In each case, impact avoidance and mitigation measures are proposed. The mitigation measures are numbered to allow cross referencing to Tables B-2 and B-3 and to the Commitments Register presented in Appendix E. The numbers for commitments are referenced in the following way:

00-00 Topic-specific, generic construction commitments
X Location-specific commitments
OP Operational commitments
D Design commitments
DE Decommissioning commitments
LACF Land Acquisition and Compensation Framework commitments

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

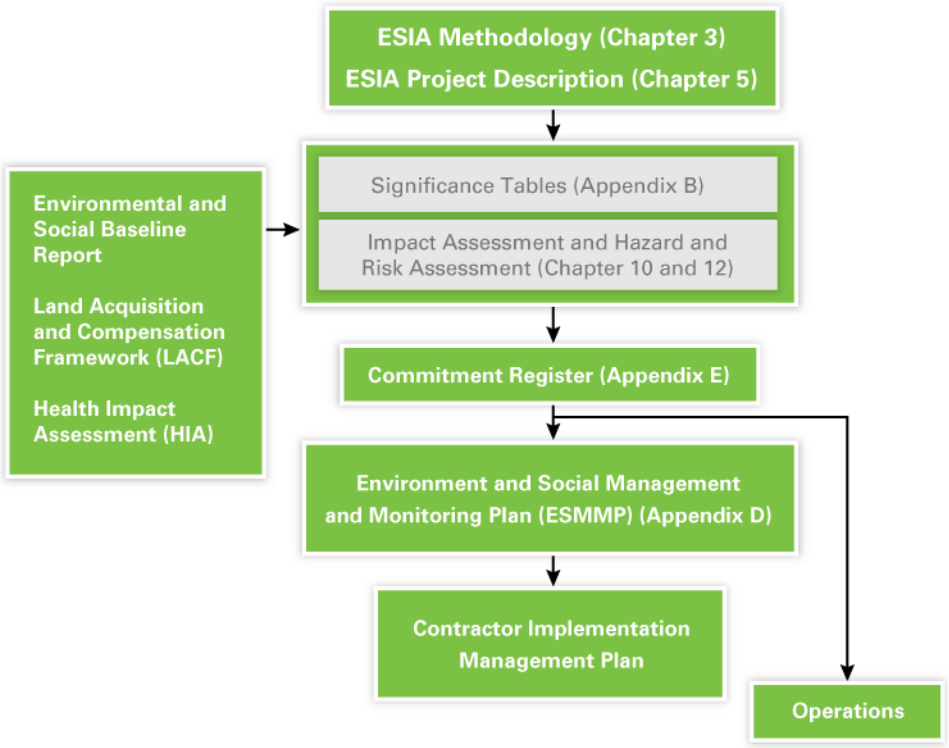

Figure 10-1: Schematic Showing Relationship between Impact Assessment and Commitments Register

To avoid repetition, where a mitigation measure relates to a number of different impacts in Sections 10.3 to 10.16 and has been discussed previously in the chapter, it is included in other relevant impact assessment tables which follow, but not repeated in the explanatory text.

10.1.2 Commitments Register

The Commitments Register (Appendix E) sets out all the specific mitigation measures that the Project currently proposes to adopt in relation to potential impacts identified in the ESIA. It is the exclusive and authoritative record of the mitigation measures proposed. The

Commitments Register is intended to be read in conjunction with the full text of this ESIA document, which provides important context and background, as well as describing the impacts that the listed measures aim to mitigate or manage and the residual impact that may remain.

10.1.3 Monitoring and Management

The Project's Environmental and Social Management and Monitoring Plan (ESMMP) presented in Appendix D is the primary mechanism for implementing the measures listed in the Commitments Register during construction. The ESMMP forms the basis of contractual agreements between the Project and the main contractors involved in Project construction. The ESMMP contains a set of 13 topic-specific management plans as listed below.

- Reinstatement Plan
- Ecological Management Plan
- Waste Management Plan
- Pollution Prevention Plan
- Resources Management Plan
- Construction Camp Management Plan
- Infrastructure and Services Management Plan
- Community Health, Safety and Security Plan
- Community Liaison Plan
- Local Recruitment and Training Plan
- Procurement and Supply Plan
- Cultural Heritage Management Plan
- Land Management Plan.

The Commitments Register (Appendix E) identifies which management plan(s) address each commitment.

The construction contractor will have a documented and operational ESMS aligned with the requirements of ISO 14001 Environmental Management Systems (1-13).

Operational management and monitoring plans will be developed to implement operational commitments before the Project moves to the operations phase. Chapter 13 provides more detail on construction and operations phase management and monitoring. Ongoing training programme for facility personnel will be implemented to include environmental compliance and reporting (OP18).

10.1.4 Constraints Maps

Appendix A presents maps that show physical, biological, cultural heritage and social constraints in the SCPX Project area. 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 in the SCPX Project area 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, including commissioning where this activity may also have significant impacts, and (b) operation of the SCPX Project. The discussion focuses primarily on construction phase activities, as gas pipelines are not generally associated with any significant planned impacts as a result of activities during operation. The operation of the SCPX pipeline is planned to

be incorporated into the existing management system for operation of the SCP and BTC pipelines. The impacts of commissioning are generally related to a limited range of specific aspects and this activity is therefore discussed only as needed in the following sections.

Mitigation of potential impacts has been an integral part of the Project conceptual design including route, site and crossing method selection, which is described in detail in Chapter 4. This has included:

- Re-routing certain sections of the pipeline to avoid areas of high environmental and social sensitivity
- Evaluating the potential environmental and social impacts of the proposed options for siting camps, pipe storage areas, rail spur and offloading areas and access roads as part of the site selection process for these areas. These sites were identified in two phases, as described in Sections 4.7 and 5.5.3.

The mitigation measures incorporated into the engineering design process have been described in detail in Chapter 5 and these Project design commitments have been incorporated into this chapter, in addition to mitigation measures which will be implemented during both construction and operation.

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).

Secondary impact assessment has been an integral part of the ESIA process and the identification of impacts and mitigation measures that are described in this chapter. Where secondary and indirect impacts have been identified within Tables B-2 and B-3, these have been highlighted in light blue for ease of identification. Where impacts are both a primary and a secondary impact, these have been highlighted in purple. Where an impact is a secondary or an indirect one, this is also discussed in this chapter. Examples of potential secondary impacts that have been identified for the proposed SCPX Project include:

- Stress or mortality of flora and fauna due to drilling mud break out into watercourses
- Cleanup of unexploded ordnance, which will reduce the risk of injury or death to both construction personnel and the public.

Examples of combined primary and secondary impacts of the SCPX Project are:

- Temporary disruption of irrigation or drainage causing loss of agricultural production
- Contamination of water used for potable water supply with sediment, fuel or chemicals.

10.1.5.2 Cumulative impacts

This chapter considers the potential cumulative (or additive) impacts of the proposed SCPX Project 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).

The interaction of individual impacts from the proposed SCPX Project (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. The potential impacts associated with the individual topic areas are discussed in this chapter.

10.1.5.3 Consultation

During the ESIA process attention was paid to stakeholder concerns as expressed during the series of consultation meetings (refer to Section 9.5). SCPX Project design and location decisions were influenced by such concerns (Section 9.6). To the extent practicable, and without prejudicing the safe and efficient operation of the Project, changes were made with the aim of avoiding, preventing and/or reducing adverse impacts. For example, the pipeline as proposed has a thicker wall where it is in close proximity to inhabited sites to help reduce the hazard potential.

In addition, certain impact mitigation commitments have been devised, and included in a series of environmental and social management plans, with the intent of helping achieve the same objectives. Examples of mitigation commitments designed to help to deal specifically with stakeholder concerns are as follows.

Land acquisition and livelihoods
A Land Acquisition and Compensation Framework (setting out the principles and key mechanisms by which livelihoods would be maintained) and an accompanying Guide to Land Acquisition and Compensation will be prepared and will be provided to those likely to be affected by land acquisition. Also, natural resource features such as wetlands that are used for watering of livestock will be preserved or, to the extent that is not practicable, a substitute will be provided and access to grazing will be maintained or, if restricted, to the minimum extent reasonably practical.

Infrastructure damage
A number of commitments relate to the aim of avoiding damage and to repair, should any damage occur.

Employment opportunities
There is a presumption in favour of employing local people if the skills needed are available. Targets for local recruitment (subject to the availability of the skills needed) will be set and local recruitment will be monitored regularly to assure that this commitment is met.

Ecological management
Flora and fauna along the route of the pipeline and associated facilities will be protected by a number of measures such as species translocation, pre-construction surveys and clearing of habitats.

Community health and safety
Commitments will be applied to suppressing dust, minimising risk of fuel spills, limiting speed limits for Project vehicles and lowering noise emissions from construction activities.
Community liaison
Commitments will be applied to assist with timely supply of information on forthcoming Project activities to people within Project-affected communities (PACs).

10.1.5.4 Decommissioning

This chapter does not deal in any detail with the anticipated impacts of decommissioning (abandonment) of the Project once it reaches the end of its operational life as this is covered by the HGA, which details the applicable environmental, health, safety and social standards and practices governing the Project (see Chapter 3). In brief, the HGA requires that, within 30 days of termination of the HGA a plan must be prepared describing how abandonment

will be achieved. This Abandonment Plan will be subject to approval by the Government. An ESIA will be prepared prior to implementation of the Abandonment Plan to assess and minimise potential environmental and social impacts arising from the abandonment operations. This abandonment ESIA will be submitted to the Government (DE-05). Upon completion of the abandonment operations an assessment of contaminated land will be prepared recording the final contamination status of the location of the Project facilities. This assessment will be subject to governmental approval (DE-06). The appropriate mechanism is therefore already in place to identify and assess the impacts of abandonment at the appropriate time. For further detail, please refer to the relevant provisions of the HGA.

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

There remains a possibility that changes to the Project will occur subsequent to preparation and submission of this ESIA. 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). In particular:

- The relevant authorities will be consulted if the need for any additional land take is identified and the relevant permits and consents will be obtained (39-01)
- Site assessments (taking into consideration ecology, cultural heritage, social, erosion risk, water resources) will be undertaken if the need for additional land is identified following submission of the ESIA (39-02)
- An environmental and social assessment report will be prepared by the Project if any additional land outside that described in the ESIA is to be used, the scale of which will depend on the proposed activities and sensitivities of the area (39-03).

The aim of this work will be to try to avoid or reduce any significant adverse impacts arising from the change and to enhance any beneficial impacts.

Should there be any significant changes to the operations of SCPX such as increased throughput, environmental policies and standards shall be considered as an integral part of any engineering assessment. This will be achieved through the Management of Change system (OP19) that will be adopted for the operations phase.

10.2 Geology and Geomorphology

This section discusses potential impacts on geology and geomorphology (including topography) during construction and commissioning of the proposed SCPX Project and associated mitigation measures to be adopted. The operational phase is not expected to affect, or be affected by, geology and geomorphology as no fault zones are crossed by the pipeline.

10.2.1 Aspects of SCPX Project that Could Affect Geology or Geomorphology

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

- Benching of the ROW to form a safe, flat working area particularly where the SCPX crosses narrow ridges
- Aggregate extraction for construction of camp, pipe storage areas and rail spur and offloading areas, construction or upgrading of access roads, supply of pipeline padding material or construction of permanent buildings and hardstanding at the pigging station and block valves (BVRs). This may come from either existing quarries/aggregate extraction facilities operated by third parties or borrow pits opened up by the Project

- Consumption of aggregates in concrete batching plants providing concrete to the Project.

10.2.2 Key Sensitivities

The majority of the proposed route passes through soft and unconsolidated sediment that can be sensitive to erosion; potential impacts are discussed in Section 10.3.2.

Azerbaijan experiences relatively frequent earthquakes; the proposed pipeline is routed through an area that is less seismically active than other regions and has been routed to avoid crossing any seismically active faults.

Aggregate extraction is known to occur at rivers crossed by the proposed pipeline route; this has the potential to influence river morphology both up and downstream, which may affect pipeline crossings.

The pipeline crosses a number of narrow erodible ridges, as detailed in Section 10.3.2.

10.2.3 Impacts on Geology and Geomorphology

10.2.3.1 Proposed pipeline construction and commissioning, including pigging station, block valves, construction camps, pipe storage areas and rail spur and offloading areas

Impacts on geology and geomorphology are expected to be very limited, as no blasting is currently expected to be necessary during construction of the proposed pipeline or facilities.

Impacts on geomorphology associated with construction along ridges are discussed in Section 10.4, Landscape and Visual Impacts; erosion issues associated with ground disturbance are discussed in Section 10.3, Soils and Ground Conditions; erosion issues at watercourses are discussed in Section 10.5, Surface Water Resources; 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, which is confined to a discussion of impacts associated with aggregate use.

It is estimated that approximately 65,000m^3 of aggregates will be needed during construction for use in surfacing camp, pipe storage areas and rail spur and offloading areas, access roads and permanent facilities. Aggregates will also be needed for use as padding material for the pipeline, for concrete where concrete coating of the pipeline is needed and for constructing hardstanding and buildings at the pigging station and BVRs. 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.

Aggregate is commonly extracted by third parties from the beds or flood plains of rivers in Azerbaijan, which may lead to changes to the morphology of these rivers with consequent primary impacts on channel position and location, riverbank erosion and the location of areas flooded during high river flows. This in turn may have secondary impacts on the SCPX pipeline by eroding the cover over the top of the pipeline or leading to flotation of the pipeline where it is laid in an area that was not predicted to be flooded. Secondary impacts could also include removal of agricultural land from use due to erosion of riverbanks and consequent impacts on livelihood of landowners and users.

Extraction of aggregates from new sites may have adverse impacts, if poorly sited, on ecology, water resources, cultural heritage landowners, land users and communities.

10.2.3.2 Pipeline operation

The pipeline and facilities are within a seismically active area and may be affected during operations by earthquakes in the region. However, the proposed pipeline is routed through

an area that is less seismically active than other regions in Azerbaijan and has been routed to avoid crossing any seismically active faults.

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 10-1: Potential Generic Impacts on Geology and Geomorphology

Issue		Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
A1	Use of raw materials and natural resources	Depletion of natural resources e.g. aggregates	B3 Low	1-01, 1-03, 1-05, 1-06, 1-07, 1-09, 1-10, 1-11, 1-14, 39-01, 39-02, 39-03	B3 Low
		Dust, noise, landscape, traffic, visual, surface water, livelihood and ecological impacts from borrow pits and spoil disposal sites	B4 Medium		B2 Low

* assessed using Tables 3-3 and 3-4

10.2.3.4 Mitigation of impacts on geology and geomorphology

At the design stage
The SCPX is proposed to commence at SCP KP57 to avoid the following geological hazards (as discussed in Chapter 4, Project Development and Evaluation of Alternatives):

- The presence of a number of mud volcanoes in the Gobustan area
- Mud volcano ridge (SCP KP24–KP29), which is a narrow ridge in an area of highly erodible soils that poses construction difficulties
- A fault zone (mud volcano fault) – SCP KP24.1
- Two faults at Hajigabul at SCP KP49.9 and KP50.9.

Between KP0 and KP390 there are no active fault crossings.

Proposed pipeline construction and commissioning, including pigging station, block valves, construction camp, pipe storage areas and rail spur and offloading areas
The impact avoidance and mitigation measures summarised below are proposed to be applied to borrow pits, quarries and the use of aggregates and other quarried materials.

All excavated material will be screened and reused to the extent deemed feasible by Company to minimise the need for new aggregates (1-07). In particular, excavated soil will be screened and reused for padding, wherever practicable (1-14). Where this is not practicable or the material is not suitable, aggregates will only be sourced from licensed sources as approved by MENR (1-01).

The project will give preference to using existing borrow pits and/or spoil disposal pits where reasonably practical (1-03). The following will be undertaken before borrow pits and/or spoil disposal pits are re-opened or a new one is established (see also Section 10.1.6):

- The relevant authorities will be consulted if the need for any additional land take is identified and the relevant permits and consents will be obtained (39-01)
- Site assessments (taking into consideration ecology, cultural heritage, social, erosion risk, water resources) will be undertaken if the need for additional land is identified following submission of the ESIA (39-02)
- An environmental and social assessment report will be prepared by the Project if any additional land outside that described in the ESIA is to be used, the scale of which will depend on the proposed activities and sensitivities of the area (39-03).

Environmental audits will be undertaken at any proposed third-party borrow pits and/or spoil disposal pits before they are used. Periodic audits will be undertaken thereafter as considered appropriate by the Company (1-05).

One of the aims of the assessment and audit of new and existing sites will be to avoid as far as practicable the secondary impacts described in Section 10.2.3.1.

Use of borrow pits will be managed in a manner that seeks to ensure that no illegal extraction (including by a third party) takes place (1-06).

When camps and lay-down areas are taken out of service, the existing aggregate will be used, as approved by the Company to landscape areas of the site before topsoil is spread; where this is not appropriate, the aggregate will be returned to borrow pits/COMPANY approved disposal areas (1-08). All temporary borrow pits will be reinstated (unless instructed otherwise by regulatory authorities) (1-09).

Where excavated material is unsuitable for padding or backfilling, padding materials (e.g. sand or small-grained soils/gravel materials) will be bought or sourced from approved borrow pits (1-10).

Where benching is required, surplus subsoil will be stored on the ROW or, if disposal is necessary, it will be transported to an approved disposal site and/or approved borrow pits (1-11). Care will be taken to ensure that the trench spoil is spread beneath the topsoil and is not left on the surface (1-12).

10.2.4 Residual Impacts

With the implementation of the proposed mitigation measures, it is considered that the residual impacts associated with aggregate use will be of low significance.

10.3 Soils and Ground Conditions

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

10.3.1 Aspects of SCPX Project that Could Affect Soils and Ground Conditions

Project activities that may affect soil and ground conditions during construction of the SCPX Project are considered to be:

- Disturbance and removal of soil during ROW and temporary site clearance (construction camp, pipe storage areas and rail spur and offloading areas), widening of access roads and creation of new access roads
- Removal of soil and civil engineering works at the pigging station and the five new BVRs
- 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 commissioning, the discharge of hydrostatic test water has the potential to cause soil erosion if not controlled carefully.

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 along the proposed pipeline route 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 texture of the soils along the majority of the proposed pipeline route is very small, primarily fine silts and clays, which are considered more prone to erosion
- Four areas of the proposed pipeline route – SCPX KP260–KP264 (around the Sarisu crossing), SCPX KP321–KP327 (narrow erodible ridges on approaches to Asrikchay and Tovuzchay), SCPX KP344–KP347 (approaches to the Hasansu) and SCPX KP359 (around the positive banks of the Kura West crossing) – are noted as having particularly high erosion potential
- Topsoil depth is very thin (less than 5cm) in many places along the route
- 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
- Within the Karabakh and Ganja-Gazakh Plains the proposed pipeline route is predominantly routed through agricultural land that is used for cereal production.

10.3.2.2 Contamination

- Contamination was identified at various locations along the proposed SCPX route and at the proposed construction camp, pipe storage areas and rail spur and offloading areas
- The majority of contamination identified appeared to be the result of ongoing fly-tipping by third parties; it is therefore likely to be an ongoing issue and may prove difficult to prevent or mitigate
- Hydrocarbon contamination of soil was noted during a visual inspection at the SCPX route at KP7 (unknown source) and at KP215 (old, leaking oil well)

- 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. 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
- The potential for the presence of unexploded ordnance (UXO) has been identified in two areas along the ROW and in the proposed pipe storage area and camp located at Saloghlu. The first area, to the west of the Kura West crossing (KP358–KP390) has already been cleared and declared safe; the second, around the Kura East crossing (KP167–KP172) will be cleared in the near future. There is, however, the potential for additional areas of UXO to be identified should the Project footprint change.

10.3.3 Impacts on Soils and Ground Conditions

10.3.3.1 Proposed pipeline construction and commissioning, including pigging station, block valves, construction camps, pipe storage areas and rail spur and offloading areas

Compaction
Compaction of soils during construction may occur where the bearing strength is exceeded by the weight of construction vehicles. This is most likely on the ROW, access roads and heavily utilised areas of construction camp, pipe storage areas and rail spur and offloading areas, which will be subject to repeated vehicle movements.

The primary impacts of soil compaction are 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
The depth of topsoil along the SCPX route is generally very low (less than 5cm), particularly in the semi desert areas (Photograph 10-1), and areas of narrow ridges (as described in Section 10.3.2). In these areas, stripping of topsoil and segregation of topsoil and subsoil will be more difficult.

Photograph 10-1: Thin Soils in the Shirvan Plain

It is likely that topsoil depth will be greater in river valley areas, and as the ROW progresses further westwards towards the Georgian border. Deeper topsoil depths (over 10cm) were recorded in the 2001 survey (see Section 7.3). Exact topsoil depth along the ROW will need to be confirmed by a pre-construction survey.

Soil structure and nutrient content may be impaired and therefore affect revegetation, if topsoil and subsoil layers are mixed during construction and/or storage, or if surplus subsoil is disposed of carelessly (e.g. by spreading over topsoil or vegetation).

Prolonged storage of topsoil can lead to a loss in fertility of the soil as nutrients become leached out by rainfall or anaerobic conditions can develop within the topsoil pile. It may also lead to the loss in viability of the seed bank contained within the stored soil.

Oxygen availability may be reduced by water logging of soils or prolonged storage; anaerobic conditions may develop if soil is stored for longer than six months with similar primary and secondary impacts to those described for compaction above.

Secondary impacts may include adverse ecological impacts due to poor establishment of vegetation following reinstatement and loss of agricultural productivity. These are discussed in Sections 10.7.3 and 10.13.3 respectively.

Erosion and soil loss

Preparation of the ROW, construction camps, pipe storage areas, rail spur and offloading areas and access roads, 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. The erosion risk is expected to be highest during wet weather, when runnels may develop, and will be exacerbated by vehicle movements.

A baseline assessment of the erosion class of the soil along the SCPX ROW 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 7-10). Erosion classification of the soils along the entire SCPX ROW has been provided in Table 7-11. Locations with

the highest erosion risk are listed as sensitivities in Section 10.3.2. Stability at areas that already exhibit active erosion could be made worse by construction of the pipeline sections if not managed correctly. This may also lead to accelerated erosion of the ROW and pipe trench following reinstatement, thereby risking the integrity of the pipeline.

Topsoil removed from the ROW will be stored at the edge of the working area pending replacement during reinstatement. Topsoil stacks/piles are usually poorly consolidated and therefore prone to erosion and soil loss via wind erosion or wash out by rainfall, both of which are likely to occur in the areas crossed by the pipeline route.

Treated hydrotest water will be discharged either to land or to a watercourse. Erosion may occur at the point of discharge if the flow rate is inadequately controlled. This can lead to scour and increased sediment loading if the discharge is to a watercourse.

Construction of the proposed pigging station and five new block valves will necessitate the excavation of topsoil and subsoil. The footprints of the block valve sites are relatively small in size (875m^2 each), with the pigging station being larger at 3200m^2 (these are the areas enclosed within the proposed security fence). Soils will be reused locally and will therefore be permanently lost from their point of origin.

Where existing roads identified for access to the proposed ROW are widened, construction will entail the movement of topsoil and subsoil that will be permanently lost from its point of origin. Topsoil of any value will be re-used locally.

Soil erosion may have secondary ecological impacts on aquatic fauna (as a result of sediment release into watercourses) and could lead to impaired recovery of natural vegetation. These potential impacts and proposed mitigation measures are discussed in Section 10.7. Soil erosion may also affect agricultural productivity; see Section 10.13 for discussion of impacts and mitigations.

Flooding
The occurrence of natural floods, not related to Project activities, in river valleys has the potential to cause immediate soil erosion and soil loss. Floodwaters can also entrain contaminants. These impacts can, in turn, lead to longer-term loss of soil fertility, with potential secondary impacts on vegetation recovery and the use of the land for agriculture. The location of the impacts of these natural occurrences could, however, be altered by the presence of pipeline construction works. In particular, soil storage mounds and temporary bridges or flumes placed in watercourses to facilitate pipeline construction across the river could have the effect of damming or diverting floodwater.

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
A number of contaminated and potentially contaminated sites were identified along the ROW and at potential camp, pipe storage and rail spur and offloading areas as part of the

baseline survey 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 a risk that areas of as yet unidentified contamination may be encountered during construction of the pipeline, pigging station, BVRs, camp, pipe storage and rail spur and offloading areas, 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 where contaminants (particularly heavy metals) may have accumulated in riverbed sediments, particularly on the inside bends of meanders. Pipeline crossings downstream from heavily industrial areas may therefore be at risk of contamination
- Areas of potential (but as yet undiscovered) UXO along the pipeline ROW, camp, pipe storage and rail spur and offloading areas and access roads
- Any new or additional construction camp, pipe storage and rail spur and offloading areas, particularly if they are located on brownfield sites
- 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
Activities associated with construction have the potential to produce soil, groundwater and surface water contamination. The principal potential contaminants associated with the construction activities are as follows:

- Fuels and lubricating oils
- Hazardous wastes
- Welding wastes and field welding and coating materials
- Paints and solvents
- Sewage
- Hydrotest chemicals if used (e.g. biocides, oxygen scavengers and corrosion inhibitors) on new pipe sections
- High pH run-off from concrete batching areas.

Soils, surface or ground water may become contaminated by fuel, oil and chemical spills from plant. Contamination can also be caused if substances from hazardous waste storage leach into the ground, or if raw sewage is accidentally discharged onto the ground. Quantities will vary depending on the amount stored and time taken to detect.

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 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

Table 10-2 and Table 10-3 provide an assessment of the likely significance of impacts on soil resources before and after implementation of the proposed mitigation measures that are discussed in the following section.

Table 10-2: Potential Generic Impacts on Soils and Ground Conditions

Issue		Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
A2	Soil compaction	Loss of drainage capacity with increased surface water run-off	C4 Medium	2-01 to 2-05, 2-07, 3-09, 3-15, 4-03, 4-06, 4-08, 4-13, OP61	C2 Low
A3	Soil erosion	Loss of topsoil causing impaired reinstatement	C-D4 Medium - High	3-03, 3-05, 3-07, 3-08, 3-09, 3-15, 3-17, 3-23, 3-26, 3-28, 3-32, 3-33, 4-07, 4-08, 4-09, 4-12, 4-13, 10-11, 10-12, 10-16, 10-19, 17-07, D5-086, OP136	C2 Low
A4	Loss of soil structure, fertility and seed bank	Development of anaerobic conditions in stored soil	C3 Medium	3-11, 4-02, 4-03, 4-04, 4-05, 4-08, 4-09, 4-15, 4-22,	C2 Low
A5	Ground settlement following restoration of pipeline trench	Soil erosion	C3 Medium	2-05	C2 Low
A6	Disturbance, treatment and disposal of known/unknown contaminated land	Mobilisation of soil contaminants	C3 Medium	6-01, 6-02, 6-13, 6-14, 6-16, 6-18, 6-22, 6-25, 7-05	C Beneficial

Issue		Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
A7	Production and disposal of solid and liquid waste	Contamination of soil	C4 Medium	6-03 to 6-12, 6-20, 6-21, 6-24, 7-01 to 7-04, 7-08, 7-12, 7-13, 7-14, 7-15, D5-028, D5-029, D5-030, D5-080, D5-106, DE-06	C1 Low
A9	Disposal of surplus subsoil and aggregate	Loss of soil structure, fertility and seed bank	C2 Low	1-08, 1-12, 9-01, 9-02, 9-04, D5-066,	C1 Low
A13	Flooding	Soil erosion, soil contamination and loss of fertility	B or C3 Low to Medium	13-01, 13-02, 13-03, 13-05	B or C2 Low
A39	Storage of chemicals, oil, fuel, accidental spills	Contamination of soil	C4 Medium	6-03 to 6-12, 6-20, 6-21, 7-10 to 7-14, 7-16, 10-01, 39-06,	C2 Low
A40	Disturbance of unexploded ordnance	Clean-up of unexploded ordnance will reduce the risk of injury or death to both construction personnel and the public	E5 High	40-01, 40-02, 39-01	Beneficial

* assessed using Tables 3-3 and 3-4

Table 10-3: Soil Impact Assessment at Sensitive Locations and/or Receptors

Location	Issue	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
KP0-KP26	Thin topsoil layer	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	B4 Medium	X3-02, 4.15	B2 Low
KP7 Contamination	Hydrocarbon contamination	Health and safety of workforce and risk of mobilisation of contaminants into the wider environment	B3 Low	X5-12, 6-01, 6-02	B- Beneficial

Location	Issue	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
KP7, KP98, KP102, KP104, KP141, KP150, KP151, KP187, KP189, KP198, KP199, KP215, KP231, KP235, KP243, KP245, KP261, KP276, KP281, KP300	Various asbestos, hydrocarbon and municipal waste contamination along the ROW	Health and safety of workforce and risk of mobilisation of contaminants into the wider environment	B3 Low	6-01, 6-02	B- Beneficial
KP168–KP172	Potential UXO area near Kura East crossing. To be cleared	Potential disturbance of unexploded ordnance	E5 High	39-01, 40-01, 40-02	E1 Low
KP260–KP264	Thin, highly erodible soils	Increased erosion and gullying	D4 High	As per A2, A3 and A4, particularly X3-02	D3 Medium
KP321–KP327	Narrow erodible ridges with thin topsoil before and after the crossing of the Asrikchay and Tovuzchay	Thin topsoil in this section is at risk of loss during construction leading to poor reinstatement	D4 High	As per A2, A3 and A4, particularly X3-02	D3 Medium
KP344–KP347	Approach to the Hasansu over narrow ridges with thin erodible soils	Thin topsoil in this section is at risk of loss during construction leading to poor reinstatement	D4 High	As per A2, A3 and A4, particularly X3-02	D3 Medium
KP358–KP390	UXO area Kura West crossing to Georgian border (now cleared)	Potential disturbance of unexploded ordnance	E5 High	39-01, 40-01, 40-02	E1 Low
Dallar Pipe Storage and Dallar Rail Spur and Offloading	Asbestos cement and municipal waste contamination	Health and safety of workforce and risk of mobilisation of contaminants into the wider environment	B3 Low	6-01, 6-02	B- Beneficial
Gazanchi Pipe Storage Area Option A	Asbestos contamination	Health and safety of workforce and risk of mobilisation of contaminants into the wider environment	B3 Low	6-01, 6-02	B- Beneficial
Gazanchi Pipe Storage Area Option B	Asbestos contamination	Health and safety of workforce and risk of mobilisation of contaminants into the wider environment	B3 Low	6-01, 6-02	B- Beneficial

Location	Issue	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
Gazanchi Rail Spur and Offloading	Asbestos contamination	Health and safety of workforce and risk of mobilisation of contaminants into the wider environment	B3 Low	6-01, 6-02	B- Beneficial
Goranboy Camp Option 3	Medical and municipal waste contamination	Health and safety of workforce and risk of mobilisation of contaminants into the wider environment	B3 Low	6-01, 6-02	B- Beneficial
Kurdemir Rail Spur and Offloading Area	Asbestos cement and municipal waste contamination	Health and safety of workforce and risk of mobilisation of contaminants into the wider environment	B3 Low	6-01, 6-02	B- Beneficial
Kurdemir Pipe Storage Area Option 1 (Mususlu)	Asbestos cement, medical waste and municipal waste contamination	Health and safety of workforce and risk of mobilisation of contaminants into the wider environment	B3 Low	6-01, 6-02	B- Beneficial
Mugan Pipe Storage Area	Asbestos cement and municipal waste contamination	Health and safety of workforce and risk of mobilisation of contaminants into the wider environment	B3 Low	6-01, 6-02	B- Beneficial
Mugan Rail Spur and Offloading Area	Asbestos cement and municipal waste contamination	Health and safety of workforce and risk of mobilisation of contaminants into the wider environment	B3 Low	6-01, 6-02	B- Beneficial
Saloghlu Rail Spur	UXO are known to be present at the site	Potential disturbance of unexploded ordnance	E5 High	39-01, 40-01, 40-02	E1 Low
Saloghlu Camp	UXO are known to be present at the site	Potential disturbance of unexploded ordnance	E5 High	39-01, 40-01, 40-02	E1 Low
Saloghlu Pipe Storage Area	UXO are known to be present at the site	Potential disturbance of unexploded ordnance	E5 High	39-01, 40-01, 40-02	E1 Low

Location	Issue	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
Ujar Camp Option 5	Asbestos cement and municipal waste. Potential contamination by pesticides	Health and safety of workforce and risk of mobilisation of contaminants into the wider environment	B3 Low	6-01, 6-02	B- Beneficial
Yevlakh Pipe Storage Area	Asbestos board cement	Health and safety of workforce and risk of mobilisation of contaminants into the wider environment	B3 Low	6-01, 6-02	B- Beneficial

* assessed using Tables 3-3 and 3-4

10.3.4 Mitigation of Impacts on Soils and Ground Conditions

The impact avoidance and mitigation measures summarised below will be applied with the aim of reducing adverse impacts on soils and ground conditions.

10.3.4.1 At the design stage

Erosion and soil loss – pipeline

A suite of erosion control measure 'tool boxes' was used on the BTC and SCP pipelines and has proved effective. These erosion toolboxes are methods of erosion control that define detailed needs and instructions at specific locations. The toolboxes are used to design the location specific erosion control measures, which are included on the pipeline alignment sheets. The measures are summarised below in Table 10-4 and will be implemented along the proposed SCPX pipeline according to the erosion risk at each location, to design erosion control measures with the aim of achieving Erosion Class 3 or better; see Section 7.3.3.7 for more information on the erosion class system.

Table 10-4: Toolboxes to be Applied for Erosion Control

Toolbox Number	Toolbox Definition
1	Top soil storage away from erosion areas, upslope from ROW
2	Subsoil and spoil storage away from erosion areas, downslope from ROW
3	Revegetation, reseeding and replanting
4	Erosion mats, sandbags, jute or geotextile
5	Diverter berms or upslope header ditches with 10m spacing

Erosion and soil loss – pigging station, BVRs and associated access roads

Surface water drainage from operational areas including access roads and temporary facilities will be designed to minimise soil erosion in accordance with sustainable urban drainage systems (SUDS) principles (3-26).

Soil fertility and contaminated land

A soil survey of camp sites and pipe storage areas that are identified will be undertaken (4-22). A baseline survey of visible contamination has been carried out and will be repeated before construction begins to include camp and pipe storage areas (6-01).

10.3.4.2 Proposed pipeline construction and commissioning, including pigging station, block valves, construction camps, pipe storage areas and rail spur and offloading areas

Soil compaction
Vehicle movements will be restricted to defined access routes and demarcated working areas (unless in the event of an emergency) (2-02), with the aim of avoiding compaction. Driving along the ROW will not be permitted in excessively wet conditions unless otherwise approved by the Company (2-03).

Temporary erosion control measures will be developed and implemented after initial land disturbance and if construction activity on the working areas is suspended over the winter before reinstatement has been completed (3-28). Topsoil will be stored outside the running track used by construction plant, equipment and vehicles (4-03) and soil storage areas will be protected from vehicle movements to avoid soil compaction (4-06).

Construction method statements will specifically aim to address construction through soft ground. Load-bearing materials, such as bog mats and geotextile membranes, will be used to support heavy loads in areas of soft ground (including wetland areas) unless deemed impractical by the Company (2-01).

Temporary drainage will be provided where necessary to prevent ponding or waterlogging of the working area (2-04).

Backfill will be adequately (but not excessively) compacted to prevent future settlement (2-05). After backfilling, the subsoil beneath the running track will be ripped prior to reinstatement of agricultural land (2-07).

Upon completion of subsoil and topsoil reinstatement, the Contractor and Company personnel will inspect disturbed areas jointly for signs of erosion, slope stability, relief, topographic diversity, acceptable surface water drainage capacity and function, and compaction. Remedial measures will be implemented, if necessary, at locations where reinstatement does not meet the Project criteria (3-15).

With implementation of the above measures, it is expected that adverse effects on soil compaction will be reduced from medium significance to low.

Soil properties (fertility, structure, seed bank)
A soil survey will be undertaken (based on a representative sample) prior to construction to measure the depth of the topsoil layer along the pipeline route and will be used to determine the depth of topsoil stripping (4-15) and the need therefore to apply commitment X3-02.

Topsoil will be stored outside the running track used by construction plant, equipment and vehicles (4-03). Stored subsoil and topsoil will be segregated in a manner that avoids mixing (4-02).

Topsoil stacks along the ROW will be free draining and stored in accordance with the Project Reinstatement Specification (4-05). The topsoil and subsoil stack surface will be compacted sufficiently with the aim of preventing erosion, without leading to the development of anaerobic conditions (4-08). If topsoil is stored for more than six months, the stacks will be monitored for anaerobic conditions and manual aeration will be undertaken if they develop (4-04).

Reinstatement will be undertaken as early as practicable and in accordance with the Reinstatement Specification (4-09).

With implementation of the above measures, it is anticipated that adverse effects on soil properties will be reduced from medium significance to low.

Erosion and soil loss

In addition to the mitigation measures already detailed above, the following will be undertaken specifically with the aim of reducing the impact on soils and soil erosion:

- Temporary erosion control measures will be developed and implemented after initial land disturbance and if construction activity on the working areas is suspended over the winter before reinstatement has been completed (3-28)
- Erosion control measures will be implemented to achieve erosion Class 3 or better (3-03). A range of 'toolboxes' has been developed for erosion control as described in Table 10-4. Sediment control fencing, drainage channels and trench barriers will be installed where appropriate (10-12)
- Land will be temporarily acquired off the ROW for construction of any sediment pits/traps or other erosion control or sediment run-off measures where needed to assist in achieving satisfactory erosion control or reductions in sediment run-off (3-33)
- The ROW will be inspected regularly for signs of erosion and sediment run-off. The frequency of these inspections will be increased in sensitive areas (3-32); these are the areas defined in Table 10-3 as susceptible to erosion and are from KP260–KP264, KP321–KP327 and KP344–KP347
- Soil loss will be monitored and corrective actions taken if it exceeds erosion class 3, in accordance with the Reinstatement Plan (3-08) (see Appendix D)
- Temporary dewatering or trench stabilisation will be undertaken where required to minimise slumping of trench walls (3-05)
- Local people will be actively discouraged from using the ROW as an access road (through use of signage, public education, leaflets etc.) (3-09)
- The topsoil and subsoil stack surface will be compacted sufficiently with the aim of preventing erosion, without leading to the development of anaerobic conditions (4-08)
- Where the Project considers that ground is sufficiently steep (generally greater than 25%), topsoil stockpiles will be protected with silt fence to help reduce washout and loss of topsoil during heavy rains (4-07)
- Topsoil stacks will be regularly inspected for compaction and erosion; corrective measures will be implemented if compaction or erosion is identified (4-13)
- The construction contractor(s) will produce method statements incorporating plans for erosion control, sediment control and reinstatement before work begins at river crossings (4-12)
- At watercourses, bank and bed material will be stored separately, away from the active channels and will not be placed where flow or drainage will be obstructed (3-23)
- The rate of discharge of water will be controlled to reduce the risk of soil erosion (3-17); this includes water pumped out of excavations and hydrostatic test water
- Daily visual monitoring of turbidity will be undertaken at river crossings while works are being undertaken at that river. This will be supplemented as necessary by probe monitoring (10-16)
- Trench breakers will be installed where downhill flow within the backfilled trench may lead to erosion (3-07)
- Reinstatement will be undertaken as early as practicable and in accordance with the Reinstatement Specification (4-09).

Hydrotest water will be treated using diffusers to entrain oxygen in a break tank, and filtration will be used with the aim of minimising suspended solids, prior to discharge. Flow

rate will be controlled with the aim of reducing the risk of soil erosion and disturbance to riverbed sediment (10-11).

Following mitigation by soil handling and reinstatement in accordance with the measures above, the residual impacts of construction activities on soil erosion are expected to reduce from medium or high to low significance.

However, in sensitive areas of thin topsoil (as defined by the Company) additional precautions will be taken with the aim of preserving the topsoil for subsequent replacement where deemed feasible by the Company (X3-02). This includes the area around the Sarisu, between KP260–KP264, and along the narrow ridges and steep slopes between KP321–KP327 (around the Asrikchay and Tovuzchay) and KP344–KP347 (near the Hasansu). Further information is given in the Reinstatement Plan (see Appendix D). Implementation of mitigation measures in these locations is predicted to reduce the residual impact to medium.

Photograph 10-2: Erodible Ridges with Thin Topsoil near Asrikchay – BTC/SCP ROW

Ground settlement
Backfill will be adequately (but not excessively) compacted to prevent future settlement (2-05).

Disposal of surplus subsoil and aggregate
Any surplus subsoil from trench excavations will normally be spread within the working width and within zones that exhibit similar subsoil types. The spreading work will be carried out in a manner that avoids the mixing of soil types to the greatest extent possible (D5-066). Care will be taken to ensure that the trench spoil is spread beneath the topsoil and is not left on the surface (1-12). Re-contouring should be sympathetic and in keeping with the surrounding landscape, and as approved by the Company, where this is not precluded by risk to integrity of the pipeline or erosion considerations (9-01). As a result, it is not normally possible to discern any difference between the topography and levels of the ROW and the surrounding area, resulting in no landscape and visual impact.

No side-casting of excess spoil outside the working area will be permitted (9-04).

All potential subsoil disposal sites and disposal plans will be subject to an environmental and social review prior to their adoption (9-02). This will include consideration of any landscape and visual impacts and mitigation that may be needed.

When camps and lay-down areas are taken out of service, the existing aggregate will be used, as approved by the Company, to landscape areas of the site before topsoil is spread; where this is not possible, the aggregate will be returned to borrow pits/Company approved disposal areas (1-08).

Flooding
In respect of flooding, the following measures will be undertaken with the aim of reducing the risk of erosion and soil loss caused by flooding:

- The Construction Contractor will monitor weather forecasts and avoid creating temporary dams in watercourses if flooding is likely (13-01)
- Gaps will be left in soil stacks at strategic locations to allow water through (13-02)
- Any flood defence banks breached by the pipeline will be replaced during reinstatement (13-03)
- The Contractor will undertake a flood risk assessment of any major open cut watercourse crossings that are planned to be constructed between April-June inclusive. This will identify potential environmental, social and health and safety impacts if flooding should occur and propose contingency plans with the aim of reducing any potential risks and impacts (13-05).

Following implementation of the measures above it is considered that the residual impacts of flooding on soil erosion and loss of fertility will reduce from low–medium to low.

Pre-existing land contamination (known and unknown)
Further investigation will be undertaken of the hydrocarbon contamination at KP7 to determine the extent of contamination (X5-12). All known areas of surface contamination (within the project footprint) will be cleared before construction begins (6-02). Contaminated soil will be segregated from uncontaminated materials and stored at least 50m away from any surface water or seasonal surface water bed (7-05). Any contaminated material storage areas will be provided with containment measures (for example, bunds, ditches, impermeable base membranes, covers) to help minimise run-off and airborne losses (6-18).

The Company will carry out a due diligence exercise to identify and manage the risk of anthrax (6-22). If any animal burial pits are identified during construction, works will cease in this location until the affected area has been subject to sampling by qualified personnel to determine if there is a risk of anthrax (6-25).

The relevant authorities will be consulted if the need for any additional land take is identified and the relevant permits and consents will be obtained (39-01).

The ROW between the Kura West crossing (KP358) and the Georgian border was identified as a potential UXO area, and has already been cleared and declared safe prior to survey work being undertaken in the area for SCPX. The ROW between KP168 and KP172 has also been identified as a potential UXO area and is currently being cleared. Where the risk of UXO is identified, the area will be cleared prior to construction (40-02). A UXO safety and security briefing will be provided to all personnel during induction (40-01).

Contamination during construction
The following mitigation measures will be implemented with the aim of reducing the risk of soil contamination:

- Hazardous chemicals will be securely stored on site in special containers in a designated storage area (7-11)

- The storage of hazardous materials will be restricted to designated impermeable hazardous materials storage areas located at least 50m from any surface watercourse or seasonal water channel (6-03)
- Requirements for the establishment of hazardous materials storage areas (e.g. bunding, impermeable surfaces, secure drainage, limited access, labelling) will be identified in the Contractor's Pollution Prevention Implementation Plan (6-04)
- A refuelling procedure will be developed by the Contractor, which will include a restriction on refuelling within 50m of any watercourse. Any deviation will be subject to approval by the Company (6-05)
- The Contractor's Implementation Plan will detail requirements for record keeping and on-site maintenance of material safety data sheets (MSDS) (6-06)
- Materials that can potentially react with each other will be segregated during storage (6-07)
- Procedures will be established to determine acceptability of material storage and to promote the minimisation of storage volumes (6-08)
- Relevant personnel will be trained in safe use and handling of hazardous materials (6-09)
- Any additives proposed to be added to the drilling mud will be subject to an environmental risk assessment before their use is approved by Company (39-06)
- Drilling and tunnelling mud will be stored in impermeable lined bunded areas or tanks (6-26)
- Disposal of the drilling mud will be subject to an environmental risk assessment (6-24)
- Concrete batching plant (if required) will be sited at least 50m away from sensitive receptors such as watercourses; wash pits to be lined with an impermeable liner (10-01).

If fuels, chemicals or wastes are spilled, or an outbreak of drilling mud occurs, the following measures will be implemented with the aim of reducing the associated potential impacts:

- Spill response equipment (absorbents etc.) will be available in hazardous materials storage areas (6-10)
- Relevant construction personnel will be trained in use of spill kits and disposal practices (6-11)
- A trained rapid response team will be mobilised in the event of spillage of hazardous materials (6-12)
- Vehicles delivering fuel or hazardous liquids will carry appropriate spill kits to allow an initial response to any spill to be deployed (6-20)
- All mobile plant (excluding vehicles) will be integrally bunded or will be equipped with a bund or drip tray that will be regularly inspected and emptied to prevent rainwater accumulating (6-21)
- The need for remedial work in any specific area will be determined on the basis of the observed contaminants, sampling and analysis to determine their concentrations and the risks that they may pose to local receptors (social and environmental) in accordance with Project Standards (6-13)
- In each area of identified contamination, a site-specific remedial action plan will be developed. The plan will include a summary of the environmental risks posed by the contamination and the procedures that are to be adopted to mitigate those risks (6-14)
- The preferred options for the treatment of contaminated soil will be based on the risks posed by the material. In keeping with the aim of minimising the transportation of hazardous materials and minimising waste generation, preference will be given to in situ and low technology remedial approaches (6-16)

- The river crossing contractor will prepare a plan to respond to an outbreak of drilling mud if this occurs during a non-open-cut crossing, including clean up and remediation for outbreak on land and liaison with downstream users in the event of outbreak in the water (7-16).

In accordance with the Project standards identified in Appendix D, ESMMP (Appendix B), clean-up will follow the methodology from the UK Environment Agency's approach, which is based on the source–pathway–receptor principle, which seeks to establish the linkages between the pollutants and the receptor, and whether harm to health or the environment is likely to occur.

The following waste management measures will be implemented to minimise the risk of ground contamination:

- All wastes from the SCPX Project will be managed with the aim of minimising (a) impacts to the natural environment and (b) potential health hazards to personnel. Where appropriate, waste materials will be reused or recycled, with disposal to landfill as a last resort (D5-029)
- In accordance with the SCPX Waste Management Plan, solid wastes generated by construction activities will be collected in waste storage areas (WSA) located at the camps (D5-028)
- Waste will be segregated to facilitate recycling and re-use (7-08)
- Non-hazardous waste will be disposed of at a Company - and Government-approved landfill site (7-02)
- Controlled or uncontrolled burning of waste will not be allowed (with the exception of Company -approved incinerators) (7-01)
- A secure hazardous waste accumulation area that meets Project requirements will be used for temporary storage at Project sites prior to transfer to an approved final hazardous storage or disposal facility (7-03)
- Hazardous waste will be forwarded to a waste disposal contractor licensed to receive and treat hazardous waste (D5-030)
- Waste management practices will be subject to regular monitoring and auditing (7-04)
- Information will be incorporated into the Site induction process and will outline the role of personnel in the management of waste and emissions from site and spill response procedures (7-14)
- Site induction training will be supplemented by regular 'toolbox' talks with relevant personnel if inspections or audits highlight failings in waste management (7-15).

For further information on the waste management strategy to be adopted by the Project, see Section 5.10.7.

The following pollution prevention measures will be implemented with the aim of minimising the risk of ground contamination:

- The camps will discharge domestic wastewater treated by a sewage treatment package designed to meet the Project standards and permit requirements (D5-106)
- Diesel storage tanks at temporary sites (e.g. construction camps, rail spur, offloading and pipe storage areas), on the ROW and at the AGIs will be located in suitably sized secondary containment with an impermeable liner. The secondary containment volume will be designed to no less than 110% of the tank volume. Loading and offloading connections will be located over secondary containment (7-10)

- Regular inspections and maintenance will be carried out of secondary containment area at camps to confirm that they are functioning effectively (7-12)
- Relevant training will be provided to those with responsibilities for monitoring of effluent discharges and emissions such as effluent sample taking and chain of custody (7-13).

Restoration
To facilitate natural re-vegetation of the ROW, the separately stockpiled topsoil and vegetation debris will be spread over the surface of the ROW following completion of grading, as appropriate (D5-086). Once the topsoil has been replaced it will be stone picked to remove any large stones that are not in keeping with the surrounding soil texture (3-11).

Upon completion of subsoil and topsoil reinstatement, the Contractor and Company personnel will inspect disturbed areas jointly for signs of erosion, slope stability, relief, topographic diversity, acceptable surface water drainage capacity and function, and compaction. Remedial measures will be implemented, if necessary, at locations where reinstatement does not meet the Project criteria (3-15).

The Project will seek to achieve an increasing trend in vegetation re-growth and species diversity (specifically species composition) in reinstated areas with reference to nearby areas undisturbed by Project activities, as recorded by the percent similarity and commonality indices (17-07). This will help reduce erosion and should help create a sustainable, self-generating plant community.

10.3.4.3 In the operations phase

Pipeline
When the 56”-diameter pipeline is operating, regular monitoring and inspections will be undertaken to check that the security and integrity of the pipeline is not compromised. Vehicular access will aim to be minimised by the following measures:

- Local people will be actively discouraged from using the ROW as an access road (through use of signage, public education, leaflets etc.) (3-09)
- The Company will encourage EPPD security patrols to use existing access tracks wherever possible, and not to drive along the ROW (17-16)
- When patrolling the pipeline, the Project will use horse patrols wherever practicable, minimising vehicular access except where necessary for maintenance purposes (OP61).

Monitoring of areas of geotechnical instability and erosion potential will be continued during operations (OP136).

The long-term visual effects of the pipeline are considered in Section 10.4.5.

Pigging station and BVRs
If permanently manned, domestic sewage from the pigging station will either be treated on or off-site (D5-080).

A monitoring programme will be developed for sanitary and industrial discharges, which will be monitored at the point of discharge to confirm compliance with the Project Standards. Monitoring will be carried out monthly for the first year of operation, after which the frequency and suite of determinants will be reviewed and revised dependent on the on the first year’s results (OP43).

Information will be incorporated into the Site induction process and will outline the role of personnel in the management of waste and emissions from site and spill response procedures (7-14).

Site induction training will be supplemented by regular 'toolbox' talks with relevant personnel if inspections or audits highlight failings in waste management (7-15).

Upon completion of the abandonment operations an assessment of contaminated land will be prepared recording the final contamination status of the location of the Project facilities. This assessment will be subject to governmental approval (DE-06).

Further consideration of the potential for contamination to surface waters is discussed in Section 10.5.4 and groundwater in Section 10.6.4.

10.3.5 Residual Impacts

With the implementation of the mitigation measures outlined above, the residual impacts on soil 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 inevitably occur, but the proposed mitigation measures will aim to relieve this impact. The residual impact is considered to be of low significance
- Similarly, residual impacts on soil properties are considered to be of low significance
- Implementation of the proposed mitigation measures is expected to reduce residual impacts associated with soil erosion from high to low significance except on the ridges and steep slopes where they may remain medium. 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 (including land cleared of UXOs) 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 spilt 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 SCPX Project and the associated mitigation measures to be adopted.

10.4.1 Aspects of SCPX Project that Could Affect Landscape and Views

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

- Vegetation clearance from the ROW, construction camp, pipe storage areas rail spur and offloading areas

- Temporary use of land for construction along the ROW and at construction camp, pipe storage areas and rail spur and offloading areas
- Construction of any new temporary access roads needed in respect of access to the construction camp, pipe storage areas, rail spur and offloading areas and the ROW
- Construction and operation of any temporary concrete batching plants
- Construction of any dedicated borrow-pits
- Construction of any spoil disposal sites
- Installation of hard bank reinforcement measures such as gabions or rip-rap at watercourses where needed 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, the new access road to the pigging station and the BVRs.

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

- Patrolling of the pipeline by security personnel, if this affects reinstatement. This is discussed in Sections 10.3 and 10.7 and is not therefore discussed further here
- The installation of new or additional hard bank reinforcement measures such as gabions or rip-rap at watercourses where necessary 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 BVRs and pigging station.

10.4.2 Key Sensitivities

10.4.2.1 Landscape character

The landscape of the proposed pipeline route is generally considered to be of low importance and low sensitivity to the type of landscape change that could occur as part of the Project. Between KP0 and KP210 (Mugan to Ganja), the proposed SCPX route is characterised by a generally flat landscape dissected by drainage and irrigation channels. Existing man-made features, including power lines, settlements, aboveground water pipelines and often poorly reinstated third-party buried pipelines, further detract from the already low landscape quality. There are very few trees, hedges or fences to obscure visibility; as such, visibility can extend for several kilometres, although views from houses are often limited by amenity tree planting around settlements.

The section that is potentially more sensitive to landscape change is the undulating land between KP286 and KP360. This section is considered to have a higher landscape quality/importance and a greater sensitivity to change. However, it also has the fewest potential sensitive human receptors, due to the lack of settlements. This section includes the approaches to the Tovuzchay, Asrikchay and Hasansu rivers, which have steep erodible ridges.

The preferred construction camp, pipe storage and rail spur and offloading areas areas are planned to be located in areas considered to be of low or very low landscape importance. The camp locations are generally distant from houses. The closest houses to a camp site are at Ujar Camp Option 5, which is 150m from the nearest houses. However, Samukh Camp Option 3 may be close to houses if an adjacent area is subject to residential development. The potential cumulative impacts of this are discussed in Section 11.4. Most of the rail spur, offloading and pipe storage areas are, however, are close to sensitive human receptors as they are near to local houses. These are identified in Table 10-6 below.

The pigging station and BVR sites, with the exception of BVR A10, are located in areas considered to be of low landscape importance. BVR A10, which is at KP334, is located in the area described above as considered to be of generally medium landscape importance.

10.4.3 Landscape and Visual Impacts

The potential landscape and visual impacts of the Project may be broadly defined as follows:

- Landscape impacts:
  - Direct impacts upon specific landscape elements (arable land, desert, semi-desert, pasture land, watercourses and field boundaries/tree belts) on and adjacent to the pipeline route, pigging station, BVRs, camp, pipe storage and rail spur and offloading areas
  - Effects on the overall pattern of the landscape elements that combine to form the landscape character of the sites and their surroundings.

- Visual impacts:
  - Direct impacts of the pipeline, pigging station and BVRs upon views in the landscape
  - Overall impact on visual amenity.

These are discussed in more detail below.

10.4.3.1 Proposed pipeline construction and commissioning, including pigging station and block valves

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 over 60% of the 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, mainly at the eastern end of the pipeline route, are anticipated to take longer to fully recover. Landscape monitoring from a survey conducted in 2011 of the existing BTC and SCP (reported in Chapter 7, Section 7.7.5.9) shows positive recovery subsequent to reinstatement (which was carried out during 2006-2007) at all selected landscape vantage points. Many areas exhibited extremely high restoration levels, particularly the central and western sections of the BTC/SCP route where restoration is considered to be between 65% and 95% complete. However, the progress of restoration of the eastern section of the SCP route from KP0–KP147 (equivalent to SCPX KP0-KP91) 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) 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 is mainly the area noted above from KP0-KP91. The other areas of particular sensitivity are where the pipeline crosses steep, erodible ridges in the area around the Asrikchay and Tovuzchay (approximately KP321-KP327) and east of the Hasansu (approximately KP344-KP347). The SCPX pipeline has been re-routed approximately 500m away from the existing pipelines between KP321 to KP323 and runs parallel to the existing BTC/SCP route at the Hasansu, although it follows the adjacent ridge and not the same ridge as BTC/SCP.

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. The exception to this is that a narrow belt of trees will need to be removed in the Dallyar Dashbulak area (between KP287 and KP289). These trees are believed to be protected, and will require approval from the Ministry of Ecology and Natural Resources (MENR) before they can be removed. The route in this area also currently passes through a house (see Section 10.13.3 for more details).

In respect of views during construction, there will be views of plant and machinery and the stripped working area from nearby houses and roads but views from houses will often be partly or wholly screened by the existing tree planting screens that surround many houses and communities in Azerbaijan. The exception to this is where the pipeline is proposed to pass through gardens close to houses at Garaberk village (at KP118), gardens and orchards at Alpout village (between KP121 and KP125) and close to houses at Dallyar Dashbulak village (between KP287 and KP289). There will be a greater temporary visual impact at these locations during construction coupled with the loss of some trees at Alpout and possibly Garaberk, as well as at Dallyar Dashbulak, as mentioned above.

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 are likely to be needed, for example where pre-existing access tracks are no longer available; see Section 5.5.4 for more information. 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 crossings along the route, listed in Table 5-7, see Chapter 5, Section 5.6.1. 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.

Many of the watercourse crossings on the existing BTC and SCP pipelines are protected by hard reinforcement, the design of which varies on a case-by-case basis but usually consists of gabions or rip-rap. Major watercourses that may need hard reinforcement at the proposed SCPX crossing points, based on initial design work completed to date and/or the presence of reinforcement over the existing pipes are the Goranchay (KP202), Kurekchay (KP221), Ganjachay (KP240), Shamkirchay (KP277), Zeyamchay (KP303), Asrikchay (KP322), Tovuzchay (KP323), Hasansu (KP345) and Kurudere (KP370). In addition, there is also existing bank reinforcement on other smaller watercourses such as the Sarisu (KP261) and

irrigation canals such as the Jairchay (KP289). Photograph 10-5 and Photograph 10-6 in Section 10.5.3.1 show the existing reinforcement works at the Ganjachay and new reinforcement works at the Hasansu and give a good indication of typical visual and landscape effects that may result from similar works.

Hard bank reinforcement also 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 during construction is likely to be needed at the main non-open-cut watercourse crossings, where work will continue overnight (Agsu canal (KP53), Geokchay (KP115), Turianchay (KP137), Kura East (KP167), Karabakh canal (KP189), Kura West (KP358)) and at major road and rail crossings. Temporary lighting will also be needed during commissioning at the main hydrostatic test points.

As noted above, the proposed pipeline route crosses steep erodible ridges east and west of the Asrikchay and Tovuzchay (approximately KP321-KP327) and the Hasansu (approximately KP343-KP345), as illustrated in Photograph 10-3, which shows the steep ridges either side of the Asrikchay. 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.

Photograph 10-3: View Looking Westwards across the Asrikchay along the Proposed SCPX Route at KP321

10.4.3.2 Proposed construction camps, pipe storage and rail spur and offloading areas

The proposed construction camps will consist of housing units, office accommodation, canteen and social facilities resulting in a temporary impact on landscape character.
The camp sites have been selected to be distant from houses. However, Ujar Camp Option 3 is approximately 150m from the nearest houses.

Fourteen of the rail spur, offloading and pipe storage sites are close to houses as listed in Table 10-6 below so there will be a temporary visual impact on local residents during the day and night, as all of the sites will need to be lit at night for safety and practicality.

The Project intends to use existing access roads or tracks to the camp, pipe storage and rail spur and offloading areas, where available, although some upgrading and some new roads are likely to be needed; see Section 5.5.4 for information. The landscape impacts of upgrading existing roads are considered to be low or potentially beneficial.

10.4.3.3 In the operations phase

The proposed pigging station will be located on a greenfield site in an area of low landscape value. Photograph 7-15 in Chapter 7 shows the area. It will comprise a fenced compound with low-level buildings. A new access road will need to be constructed to the site from the existing track. The location of this has yet to be defined, but existing tracks will be used where possible. The pigging station will be located in a rural area with no nearby receptors: the nearest dwelling is over 1km away. The visual and landscape impact of the site and access road are therefore predicted to be low.

The proposed BVRs will consist of fenced compounds with low-level buildings reached by the same access roads that run to the existing BTC and SCP BVRs, with which they are collocated. Because they are low-level sites, their visual impact is likely to be limited, except at close range, and they will be only small features within the overall landscape of each area. Photographs 7-16 to 7-20 in Chapter 7 show the site locations and the existing adjacent BVRs. The sites are all located in rural areas with few, if any, nearby houses: BVRs at KP95 and KP334, respectively, are over 1km from the nearest dwelling. BVRs at KP172 and KP243 are 400m and 500m respectively from the nearest house. The visual and landscape impacts of these sites are therefore predicted to be low. The exception is the BVR at KP21 where the livestock pens close to the site are lived in for some months of the year.

Lighting will be installed at the BVRs and pigging station. The lighting is activated automatically by the intruder detection system (IDS) and can then be reset remotely by the operations security team (who operate on a 24-hour basis). The lighting can also be switched on and off manually when needed to allow work on site. Therefore, lighting is not generally expected to be on during the hours of darkness.

The impacts of pipeline patrolling on the landscape are related to any possible impact on soils and vegetation recovery and are therefore as discussed in Section 10.3.3.2 and 10.7.3.3.

It is not possible to predict at this stage where and when any further or replacement hard bank reinforcement of the watercourses crossed by the proposed SCPX route may be needed. The aim is to design and construct the crossings to limit the need for future work but many of the rivers are active and mobile and the timescale over which major natural changes in river morphology can occur is variable but may be short. It is likely therefore that further work will be needed on some of the crossings over the length of the pipeline's life.

There will be a very minor permanent landscape/visual impact due to the presence of the aerial and pipeline markers needed to identify the route, see Photograph 10-4 for an example of one of these.

Photograph 10-4: Typical Aerial Marker Post

10.4.3.4 Impact summary and assessment of significance

Table 10-5 and Table 10-6 provide an assessment of the likely significance of visual impacts before and after implementation of the proposed mitigation measures that are discussed in the rest of this section.

Table 10-5: Potential Generic Landscape and Visual Impacts

Issue		Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
A1	Geology and geomorphology	Dust, noise, landscape, traffic, visual, surface water, livelihood and ecological impacts from borrow-pits and spoil disposal sites	B4 Medium	1-09, 39-01, 39-02, 39-03	B2 Low
A8	Visual intrusion into landscape	Modification of landscape elements (arable land, grasslands) during pipeline construction. Soil removal and soil storage during construction	B-C2 Low	D5-093, 3-19, 4-09, 8-04, 10-14, 17-08, 30-22, OP51, OP52, OP141	B-C1 Low

Issue		Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
A8	Visual intrusion into landscape	Modification of landscape elements (field boundaries, watercourses and trees) during pipeline construction. Trees and vegetation removed. Hard reinforcement at watercourses	B3 Low		B1 Low
A8	Visual intrusion into landscape	Temporary modification of views during pipeline construction	B2 Low		B1 Low
A8	Visual intrusion into landscape	Permanent modification of views and landscape character at pigging station and block valve sites	B-C2 Low	4-09, D5-096, D8-02	B1 Low
A9	Disposal of surplus subsoil	Modification of landscape and views through changed topography	C3 Medium	1-08, 1-12, 4-09, D5-066, 9-01, 9-02, 9-04	C1 Low

* assessed using Tables 3-5 and 3-6

Table 10-6: Landscape and Visual Impact Assessment at Sensitive Locations and/or Receptors

Location	Issue	Potential impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
BVR A6 (KP21)	Views from livestock pens, approximately 50m from the site, which are lived in for some months of the year	Landscape and visual impact	D3 Medium	D8-04	D1 Low
KP118	Garaberk village – route is close to houses and passes through 10–15 gardens	Removal of trees; visual impact of SCPX construction works	D4 High	X13-06, 17-08	D2 Medium
KP123	Alpout village – route close to houses and passes through approximately 6-8 gardens	Removal of fruit trees; visual impact of SCPX construction works	D4 High	X13-07, 17-08	D2 Medium
KP287-KP289	Dallyar Dashbulak village – route is close to house and passes through a belt of trees	Permanent loss of trees; visual impact of construction works	D3 Medium	X13-09, 17-08, 8-05	D2 Medium

Location	Issue	Potential impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
KP321-KP327	Narrow erodible ridges before and after the crossing of the Asrikchay and Tovuzchay	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	C4 Medium	X4-10	C3 Medium
KP344-KP347	Approach to Hasansu over narrow erodible ridges	Same impact as for KP318–KP323	C4 Medium		C3 Medium
Dallar Rail Spur	Visual intrusion	Visual impact as nearest houses 100m from site	D2 Medium	8-04	D2 Medium
Dallar Pipe Storage Area	Visual intrusion	Visual impact as nearest houses 50m from site	D2 Medium		D2 Medium
Dallar Pipe Storage Area Option B (Bayramli)	Visual intrusion	Visual impact as nearest house 50m from site	D3 Medium		D2 Medium
Gazanchi Rail Spur and Offloading Area	Visual intrusion	Visual impact as nearest houses 100m from site	D3 Medium		D3 Medium
Gazanchi Pipe Storage Area Option B	Visual intrusion	Visual impact as nearest houses 50m from site	D3 Medium		D3 Medium
Kurdemir Rail Spur and Offloading Area	Visual intrusion	Visual impact as nearest houses 50m from site	D3 Medium		D3 Medium
Kurdemir Pipe Storage Area Option 1 (Mususlu)	Visual intrusion	Visual impact as nearest houses 150m from site	D2 Medium		D2 Medium
Mugan Rail Spur and Offloading Area and Pipe Storage Area	Visual intrusion	Visual impact as nearest houses 80m from site	D3 Medium		D3 Medium

Location	Issue	Potential impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
Poylu Rail Spur and Offloading	Visual intrusion	Visual impact as nearest houses 100m from site	D2 Medium		D2 Medium
Poylu Pipe Storage Area	Visual intrusion	Visual impact as nearest house100m from site	D3 Medium		D3 Medium
Saloghlu Rail Spur and Offloading	Visual intrusion	Visual impact as nearest houses 50m from site	D3 Medium		D3 Medium
Saloghlu Pipe Storage Area	Visual intrusion	Visual impact as herder's hut on site boundary	D4 High	D8-05, 8-04	D3 Medium
Ujar Camp Option 5	Visual intrusion	Visual impact as nearest houses 150m from site	D2 Medium		D1 Low
Yevlakh Pipe Storage Area	Visual intrusion	Visual impact as nearest houses 50m from site	D3 Medium	8-04	D3 Medium
Yevlakh Rail Spur	Visual intrusion	Visual impact as nearest house 50m from site	D3 Medium		D3 Medium

* assessed using Tables 3-5 and 3-6

10.4.4 Mitigation of Landscape and Visual Impacts

The impact avoidance and mitigation measures summarised below will be applied to activities that could have visual and landscape impact.

10.4.4.1 At the design stage

As noted in Section 10.4.3, the SCPX pipeline has been routed, for the majority of its length parallel to, and partly within, the existing SCP and BTC ROW with the aim of minimising overall impacts.

The selection of any further access roads (in addition to those used during BTC/SCP construction) to Project working areas will aim to avoid sensitive receptors such as centres of communities, hospitals, clinics and schools as far as practicable (30-22). This should in turn reduce visual impacts.

Site-specific crossing designs for open-cut watercourse crossings will be prepared that will specify the depth of installation and set back distance, based on a hydrological assessment of the river, and will consider the need for protection works to protect the integrity of the pipe (X5-17).

From KP287-KP289, the ROW will be designed to minimise impacts. A detailed survey will be undertaken to determine the location of the Azeri gas pipeline in this area and therefore whether the SCPX pipeline can be re-routed to avoid the house and associated farm buildings (X13-09). At Garaberk village (KP118) it is difficult to avoid gardens. However, where practicable the ROW width will be designed to minimise impact to houses (X13-06).

At Alpout (KP123), the distance between the existing pipeline(s) and SCPX will be designed to reduce the number of trees that need to be removed (X13-07).

The necessary permit from the MENR will be applied for to cut down any Forest fund trees on the ROW or temporary working areas. The location of the Forest fund areas will be confirmed by MENR consultation (8-05).

Where trees need to be removed, compensation planting will be based on the number of trees to be removed. A re-planting ratio will be developed which will be species and region specific (17-08).

The block valves have been co-located with SCP block valves to minimise cumulative landscape impact (D5-096) and resulting effects on the character of the landscape. The only location that could not be collocated is the pigging station at the start of the pipeline. This must be located at the start of the pipeline in order that the whole pipeline can be pigged. The new access road to the pigging station will follow existing tracks where possible (X5-13). The livestock pens and temporary accommodation will be relocated a minimum distance of 200m from the boundary of BVR A6 (D8-04).

Sensitive material and colour finishes will be used for the external facades of buildings (D8-02) with the aim of reducing the visual impact of the pigging station and block valves and to assist in blending them into the landscape.

There will be a 50m buffer zone between the herder's temporary dwelling and the pipe storage boundary fence at the Saloghlu Pipe Storage Area (D8-05).

10.4.4.2 Proposed pipeline construction and commissioning, including pigging station, block valves, construction camps, pipe storage areas and rail spur and offloading areas

Prompt and sensitive implementation of the reinstatement measures stated in Section 10.3.4, in connection with the handling, storage and restoration of soil during the construction is key to mitigating landscape and visual (and ecological) impacts as vegetation recovery is strongly linked to the successful preservation and re-spreading of the topsoil removed during construction.

Before construction personnel and equipment are demobilised, temporary buildings and equipment, tools and any excess material brought on site or generated during the construction and commissioning programme will be removed (D5-093).

Reinstatement will be undertaken as early as practicable and in accordance with the Reinstatement Specification (4-09).

Field boundaries will be reinstated to pre-existing condition on completion of construction (3-19). Compensation planting will be based on the number of trees to be removed. A re-planting ratio will be developed which will be species and region specific (17-08).

The following will be undertaken before a borrow pit and/or spoil disposal pits are re-opened or a new one is established:

- The relevant authorities will be consulted if the need for any additional land take is identified and the relevant permits and consents will be obtained (39-01)
- Site assessments (taking into consideration ecology, cultural heritage, social, erosion risk, water resources) will be undertaken if the need for additional land is identified following submission of the ESIA (39-02)
- An environmental and social assessment report will be prepared by the Project if any additional land outside that described in the ESIA is to be used, the scale of which will depend on the proposed activities and sensitivities of the area (39-03).

One of the issues considered in the surveys and assessments will be landscape and visual impact and mitigation measures to seek to reduce any impacts. All temporary borrow pits will be reinstated (unless instructed otherwise by regulatory authorities) (1-09).

Mitigation measures for disposal of surplus subsoil and aggregate are discussed in Section 10.3.4.2, which should be referred to for this information. As a result of these, it is not normally possible to discern any difference between the topography and levels of the ROW and the surrounding area, resulting in no landscape and visual impact on the ROW.

When camps and lay-down areas are taken out of service, the existing aggregate will be used, as approved by the Company, to landscape areas of the site before topsoil is spread; where this is not possible, the aggregate will be returned to borrow pits/Company approved disposal areas (1-08).

Watercourse banks affected by the Project crossings will be restored to near original condition, which will be assessed individually for each watercourse or other area and defined in the Contractor's Reinstatement Implementation Plan. Any deviations (e.g. because hard reinforcement is required for erosion control) shall be subject to Company approval (10-14), see Section 10.4.4.2.

Lights will be shrouded or directed with the aim of reducing off-site light spill at the construction sites, camp and pipe storage areas (8-04).

Following pipeline installation at KP321–KP327 and KP344–KP347, 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).

10.4.4.3 In the operations phase

The existing programme of landscape monitoring of the BTC/SCP ROWs will be extended to include the SCPX ROW and temporary sites (OP141), so that the progress of reinstatement can be assessed. This programme will run in parallel with the ecological monitoring programme (3.14; see Section 10.7.4.3) so that the results can be compared.

The Project will carry out annual maintenance operations until any new tree planting for offsetting purposes has established (OP52). Follow-up monitoring to record survival of planted or re-planted trees for offsetting purposes will be undertaken until sustainable growth is achieved (OP51).

In respect of any additional bank reinforcement at watercourses, should this be needed during operations, this will be managed in accordance with OP19: Should there be any significant changes to the operations of SCPX such as increased throughput, environmental policies and standards shall be considered as an integral part of any engineering assessment. This will be achieved through the Management of Change system.

Patrolling is discussed in Section 10.3.4.3.

10.4.5 Residual Landscape and Visual Impacts

10.4.5.1 Proposed pipeline construction including block valves and pigging station

As noted in Section 10.4.3.1, 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 SCPX 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 ridges in the area between the Asrikchay and Tovuzchay between KP321 and KP327 and east of the Hasansu (KP344-KP347), as discussed in Section 10.4.3.1.

The exception to the generally low visual impact of pipeline construction is where the route passes close to Garaberk, Alpout and Dallyar Dashbulak villages. Tree removal means that the residual impact of the pipeline is predicted to be medium although this will reduce slowly over time as compensation planting establishes.

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.

The locations where hard bank reinforcement will be needed for the SCPX route have not yet been decided but would be likely to create a low residual landscape and visual impact.

The residual landscape and visual impacts of BVR A6 will be low following mitigation.

10.4.5.2 Proposed construction camps, pipe storage areas and rail spur and offloading areas

The residual landscape and visual impact of the proposed construction camp areas is considered to be low, as the sites are well away from houses. Many of the pipe rail spur, offloading areas and pipe storage areas are close to houses and temporary visual impacts are expected to be medium during construction. This is largely unavoidable as the sites need to be located at existing rail spurs.

10.4.5.3 SCPX operation

There will be a permanent visual impact from the pigging station and BVRs. The pigging station is a small compound and will not be significant in views from receptors or change the character of the landscape. The BVRs are small in scale. Visual receptors will not view them as a significant change and they will not change the character of the landscape. The residual landscape and visual impacts from installation of the BVRs and 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. The residual impact of pipeline patrolling will be low, as discussed in Section 10.7.5.

It is not possible to predict at this stage where and when any further or replacement hard bank reinforcement of the watercourses crossed by the SCPX route may be needed and the residual impact of this, which 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 SCPX Project and associated mitigation measures to be adopted.

10.5.1 Aspects of SCPX Project 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, construction camp, pipe storage areas and rail spur and offloading areas 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, BVR and pigging station construction or at the construction camp, pipe storage areas and rail spur and offloading areas
- Accidental release of drilling mud during the construction of HDD and micro-tunnel watercourse crossings
- Use of vehicles in watercourses
- Riverbank and riverbed disturbance during the construction of open-cut crossings of watercourses and installation of temporary crossings for construction plant and traffic at watercourses
- Disruption of water flows during construction of open-cut crossings of watercourses
- Abstraction of river water for use as hydrotest water and for making up drilling mud used in HDD and micro-tunnel watercourse crossings
- 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, 10.13 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 and BVRs
- 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

Many of the rivers proposed to be crossed have strongly seasonal flow regimes with increased chance of flooding particularly during the spring. This in turn has implications for programming of water-crossing installations and emergency response planning (see Section 10.3.4.2) and the availability of, and impacts of, using river water for pipeline hydrostatic testing.

Many of the rivers carry high sediment loads and four river crossings (Asrikchay (KP323), Tovuzchay (KP324), Hasansu (KP345) and Kura West (KP358)) have approaches that have been identified, due to soil type and topography, as having a high susceptibility to erosion.

Most of the rivers crossed have highly dynamic river channels with a high degree of channel instability caused by both lateral and vertical erosion of riverbanks and riverbeds during flash flood/high flow events. Examples of such rivers are the Shamkirchay (KP277) and Ganjachay (KP240). This has consequent implications for pipeline river-crossing location, design, integrity, inspection and maintenance. There are a number of rivers where additional reinforcement works have already been needed in respect of BTC/SCP, in particular the Shamkirchay (KP277).

There are a number of rivers where aggregates are actively being extracted from the river channels, in particular the Shamkirchay (KP277) Kurekchay (KP221), Zeyamchay (KP303) and Tovuzchay (KP324).

Water quality in the rivers is variable, with elevated levels of contaminants recorded in many rivers 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 many rivers in comparison to target concentrations developed following WFD guidance
- TSS above the limit for controlled waters recommended by WFD guidance
- High coliform counts at all rivers apart from the Kurudere.

The quality of the watercourses restricts their use for potable use, but small-scale use of water for domestic purposes from any of the watercourses cannot be ruled out. In addition, the Shamkir and Mingechevir reservoirs on the Kura River are important drinking water resources. The Mingechevir Reservoir feeds the Karabakh canal, which is a major source of water supply (and is crossed by SCPX at KP189). However, the nearest reservoir, the Shamkir, is 7km downstream of the SCPX western crossing point of the Kura (Kura West, KP358) so it is not considered that there is any significant risk to it from pipeline construction or operation.

The watercourses crossed by the SCPX route are generally important for agriculture and industry, being used for abstraction for agricultural irrigation, drainage and by stock for drinking.

10.5.3 Impacts on Surface Water Resources

10.5.3.1 Proposed pipeline construction and commissioning, including block valves and pigging station

Sediment release
A number of sediment-generating activities have been identified that may occur during construction. In particular, vegetation has to be removed from the working width, exposing bare soil to rainfall events, overland flow and freeze-thaw processes. Where there is a significant slope, consequent erosion may deliver fine sediments from the site to nearby rivers and streams that is then carried to downstream receptors. Sediment may also be discharged in water pumped from the pipe trench and excavations during construction and during the construction of open-cut watercourse crossings, either because of soil handling or the use of vehicles in watercourses. During tunnelling or drilling of the non-open-cut watercourse crossings on the pipeline route, there is the potential that the bentonite mud used to lubricate the drilling head/boring machine could escape via fissures in the geology and flow into rivers.

Sediment is considered a water pollutant because it reduces light levels within the water column and at the channel boundary, and can therefore have a secondary impact on freshwater ecosystems. High levels of suspended sediment also cause deposition and clogging within river gravel bars, which are often important habitats, especially for fish spawning. Clogging can therefore be detrimental to fish communities by, for example, starving fish eggs of oxygenated water supplies. The presence of high levels of suspended sediment concentration can also render potable water supplies unusable although, as noted in Section 10.5.2 above, this is unlikely to be a significant issue for the SCPX Project.

However, in Azerbaijan, many of the rivers and streams already contain high sediment loads, thus reducing the significance of additional quantities of sediment introduced during construction. This is discussed further in Section 10.7.3.1.

Abstraction of water
Flow quantity is often as important as water quality in rivers. Interruption of river flows has the potential to adversely impact ecological sustainability, fisheries, other water abstractions and the dilution of other downstream discharges.

Flow rates may be affected by water abstraction, e.g. for hydrotesting, and by temporary damming or diversion which is usually needed during installation of open-cut river crossings to reduce sediment release and to create a drier/safer working environment. Hydrostatic test water needs and the watercourses likely to be used for abstraction are identified in Section 5.7.1.2. The Project has then assessed the potential impact of abstraction at these locations in relation to seasonal flow rates in the rivers. This has shown that the necessary volumes of water can be abstracted from most of the rivers without exceeding the abstraction rate exceeding 10% of the water flow in the river at any one time, with the potential exception of the eastern section of the ROW, between KP0 and KP168. Mitigation for hydrostatic testing is discussed in Section 10.5.4.

Mitigation measures for temporary damming or diversion of watercourses is discussed in Sections 10.7.4 and 10.11.4, as the receptors are primarily ecological or farmers/land users.

Surface water contamination from fuels, oils, chemicals, solid and liquid wastes, sewage and wastewater
There is a potential for pollution from chemical contaminants at all stages of construction of the proposed SCPX Project. In particular, small accidental spillages of fuel, lubrication oil or wastewater may occur during the construction of watercourse crossings, for example due to hydraulic hoses breaking on machinery. During hydrotesting of the new pipe sections there is the potential for the release of contaminants in the water such as hydrotest chemicals if needed (it may be necessary to add corrosion inhibitors, oxygen scavengers or biocides), manufacturing residue, swarf (small metal particles usually from welding), scale and sediments when it is discharged back to watercourses. The other potential cause of contaminated water discharges is the release of high pH water from concrete batching plants.

A major oil spill is considered unlikely for this gas pipeline. The largest credible spill scenario would be a spill involving a fuel tanker operating outside a bunded area. In such case, the spill would be limited to the tankers capacity (approximately 10–15m^3).

There is a low risk of contamination being caused by substances from hazardous waste storage leaking into the ground and flowing from there into watercourses.

Surface water contamination may also be caused if untreated sewage or grey water is discharged to watercourses or if sewage treatment plants malfunction.

Washout and scour
As discussed in Section 10.5.2, many of the watercourses crossed by the pipeline are subject to significant variations in flow rates on a seasonal basis and pass through soft

erodible sediments. They are therefore highly mobile and erosive and prone to bed and bank erosion and movement of watercourse channels, with consequent risks to pipeline integrity. This in turn has led to the need to install hard bank reinforcement at the existing BTC, SCP and WREP pipeline crossings. Photograph 10-5 and Photograph 10-6 below show the hard reinforcement works carried out at the Ganjachay (KP240) and Hasansu (KP345) and are typical of many of the rivers crossed.

Photograph 10-5: Existing Reinforcement at the Ganjachay BTC and SCP Crossing Point

Photograph 10-6: Newly Installed Reinforcement at the Hasansu BTC and SCP Crossing Point

Many of the rivers are also used for sand and gravel extraction by third parties, leading to channel instability and erosion that also has potential to impact upon pipeline integrity. This is particularly the case at the Shamkirchay (KP277) site where third-party extraction has had very significant impacts on the river and has necessitated the installation of significant protection measures at the existing BTC, SCP and WREP pipeline crossing. Extraction also occurs and is a potential issue at the Kurekchay (KP221), Zeyamchay (KP303) and Tovuzchay (KP324) sites.

It is likely therefore, that reinforcement will also need to be installed at some of the SCPX crossings.

Temporary damming of watercourses leading to impeded flow
The pipeline will cross a number of watercourses using open-cut methods. Locations and details of methods of construction are given in Chapter 5. This may entail temporary damming with consequent temporary impacts on supplies to users downstream. The main channel of concern is the Karabakh canal which provides water supplies.

10.5.3.2 Proposed construction camps, pipe storage areas and rail spur and offloading areas

There is a risk that spillage of fuel, lubrication oil or chemicals or leaks of leachate from waste storage areas may occur at camp, pipe storage and rail spur and offloading area locations into the irrigation and drainage channels that are present on or around most of these sites. There is also the potential for spills from vehicles using access roads to and from these and the ROW.

In addition, sewage, wastewater from canteens and bathrooms and potentially contaminated surface water from vehicle wash down areas, roads and hardstanding will be produced and will need appropriate treatment and disposal.

10.5.3.3 In the operations phase

It is not possible to predict at this stage where and when any further or replacement hard bank reinforcement of the watercourses crossed by the SCPX route may be needed. The aim is to design and construct the SCPX crossings to limit the need for future work but many of the rivers are active and mobile and the timescale over which major natural changes in river morphology can occur is variable but may be short. It is likely therefore that further work will be needed on some of the crossings over the length of the pipeline's life.

In addition, small amounts of surface water and domestic sewage/waste water may be discharged from the pigging station. Fuel or chemicals will not be stored at the pigging station or BVR sites, with the exception of minor quantities of domestic cleaning materials.

10.5.3.4 Impact summary and assessment of significance

Table 10-7 provides an assessment of the likely significance of generic surface water impacts before and after implementation of the proposed mitigation measures. Table 10-8 identifies impacts at particular sensitive receptors. Mitigation measures are then discussed in Section 10.5.4.

Table 10-7: Potential Generic Impacts on Surface Waters

Issue		Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
A3	Soil erosion and sediment run-off following removal of vegetation and/or disturbance of ground	Erosion of river/channel banks, scour, sediment contamination of surface waters	C3 Medium	3-03, 3-15, 3-21, 3-23, 3-28, 3-32, 3-33, 4-07, 4-09, 4-12,10-12, 10-16, 10-18, 10-19, OP142, OP143, OP131	C2 Low
A7	Production and disposal of solid and liquid waste	Contamination of water used for irrigation and industrial water supply	C4 Medium	6-03 to 6-12, 6-20, 6-21, 6-24, 7-01 to 7-04, 7-08, 7-12, 7-13, 7-14, 7-15, D5-028, D5-029, D5-030, D5-080, D5-106	C2 Low
		Contamination of water used for potable water supply	C-D 4 Medium or High		C-D1 Low
A10	Disposal of trench-water and hydrotest water	Surface water contamination by sediment or chemicals	C4 Medium	3-17, 3-21, 3-24, 3-30, 10-02, 10-03, 10-04, 10-06, 10-08, 10-09, 10-10, 10-11, 10-12, 10-14, 10-15, 10-16, 10-18, 10-19, 10-21	C2 Low

Issue		Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
A11	Impeded flow of river or channel	Reduced flow may restrict use by local people	D3 Medium	10-14, 11-01, 11-02, 11-03, 11-04	D2 Medium
A12	Use of water from river or channel, e.g. for hydrotesting, dust suppression and make-up water during drilling of non-open-cut crossings	Reduced flow may restrict use by local population	D3 Medium	10-09, 11-01, 15-02, 15-03, D5-078	D1 Low
A14	Production and disposal of sewage and wastewater	Surface water contamination	A-C3 Low-Medium	14-04, 14-06, 14-08, 14-09, 7-13, 31-05, D5-080, D5-106, OP43, OP41	A-C1 Low
A39	Storage of chemicals, oil, fuel, accidental spills and mud break-out during drilling of non-open-cut crossings	Contamination of water used for irrigation and industrial water supply with sediment, fuel or chemicals	C5 High	6-03 to 6-12, 6-20, 6-21,10-01, 10-22, 39-06, 7-10 to 7-14, 7-16	C2 Low
		Contamination of water used for potable water supply with sediment, fuel or chemicals	D3 Medium		D2 Medium

* assessed using Tables 3-7 and 3-8

Table 10-8: Surface Water Impact Assessment at Sensitive Locations and/or Receptors

Location	Issue	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
KP189, Karabakh canal	Crossing of canal used to supply drinking water	Disruption of flow impacting on use of river which supplies drinking water	C4 Medium	X5-15	C1 Low
KP202, Goranchay	Open-cut crossing of river prone to erosion	Increased bank erosion. Possible threat to pipe integrity	C4 Medium	X5-17	C2 Low
KP221, Kurekchay	Open-cut watercourse crossing of high energy river; gravel extraction in river by third parties	Increased bank erosion; threat to integrity of pipeline. Possible impact of extraction on channel/flow dynamics at crossing point - potential impacts on bank erosion and pipe integrity	C4 Medium	X5-16, X5-17	C2 Low

Location	Issue	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
KP240, Ganjachay	River crossing in alluvial silty clays prone to erosion	Increased bank erosion; threat to integrity of pipeline	C4 Medium	X5-17	C2 Low
KP261, Sarisu crossing	Open-cut crossing of small watercourse located in highly erodible soils	Impact on water quality during construction; increased bank erosion; threat to integrity of pipeline	C5 High	X5-17	C2 Low
KP261, Goshgarachay	Open-cut watercourse crossing of watercourse prone to soil erosion/bank instability	Increased bank erosion; threat to integrity of pipeline	C4 Medium	X5-17	C2 Low
KP277, Shamkirchay crossing	Open-cut watercourse crossing of river located in highly erodible soils. Gravel extraction upstream by third parties	Increased bank erosion; threat to integrity of pipeline. Possible impact of extraction on channel/flow dynamics at crossing point - potential impacts on bank erosion and pipe integrity	C5 High	X5-16, X5-17	C2 Low
KP289, Jairchay	Open-cut watercourse crossing of watercourse prone to soil erosion/bank instability	Increased bank erosion; threat to integrity of pipeline	C4 Medium	X5-17	C2 Low
KP303, Zeyamchay	Open-cut watercourse crossing of high energy river; Gravel extraction upstream by third parties	Increased bank erosion; threat to integrity of pipeline. Possible impact of extraction on channel/flow dynamics at crossing point - potential impacts on bank erosion and pipe integrity	C4 Medium	X5-16, X5-17	C2 Low
KP321–KP327	Vegetation and soil removal during construction over narrow erodible ridges before and after the crossing of the Asrikchay and Tovuzchay	Increased erosion leading to sediment run-off and pollution of the watercourse	C3 Medium	X5-10	C2 Low

Location	Issue	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
KP323, Asrikchay crossing	Open-cut crossing of river that is located in highly erodible soils	Impact on water quality during construction; increased bank erosion; threat to integrity of pipeline	C5 High	X5-17	C2 Low
KP324, Tovuzchay	Open-cut watercourse crossing of high energy river; gravel extraction	Increased bank erosion; threat to integrity of pipeline. Possible impact of extraction on channel/flow dynamics at crossing point - potential impacts on bank erosion and pipe integrity	C4 Medium	X5-16, X5-17	C2 Low
KP344 to KP347	Vegetation and soil removal during construction on the approach to Hasansu over narrow erodible ridges	Increased erosion leading to sediment run-off and pollution of the watercourse	C3 Medium	X5-10	C2 Low
KP345, Hasansu	Open-cut crossing of river that is located in highly erodible soils	Increased bank erosion; threat to integrity of pipeline.	C4 Medium	X5-17	C2 Low
	Open-cut crossing is upstream of possible third party water abstraction	Impact on water quality during construction may impact on small holding downstream if this still abstracts water	C3 Medium	X5-19	C2 Low
KP369, Kurudere River	Open-cut crossing of erosion prone river	Increased bank erosion; threat to integrity of pipeline	C4 Medium	X5-17	C2 Low
Kurdemir Rail Spur and Offloading Area	Surface water run-off	Pollution of irrigation channel and wetland area to west of the site with sediment.	B5 Medium	14-06, 14-08, 7-13	B3 Low

* assessed using Tables 3-7 and 3-8

10.5.4 Mitigation for Surface Water Impacts

The impact avoidance and mitigation measures summarised below will be applied to activities that could impact surface water receptors.

10.5.4.1 At the design stage

Non-open-cut watercourse crossing techniques have been selected for a number of watercourse crossings (see Table 5-6, Section 5.6.1). These are generally because the size and flow rate of the rivers renders an open-cut crossing impractical. A non-open-cut crossing will be implemented at the Karabakh canal with the intention of avoiding any impact on flow (X5-15) and therefore any impacts on water supplies.

Site-specific crossing designs for open-cut watercourse crossings will be prepared that will specify the depth of installation and set back distance, based on a hydrological assessment of the river, and will consider the need for protection works to protect the integrity of the pipe (X5-17).

Existing liaison with gravel extraction companies will continue with the aim of ameliorating effects of the extraction works on the SCPX and existing BTC, SCP and WREP crossings at the Kurekchay, Shamkirchay, Zeyamchay and Tovuzchay (X5-16).

Diesel storage tanks at temporary sites (e.g. construction camps, rail spur, offloading and pipe storage areas), on the ROW and at the AGIs, will be located in suitably sized secondary containment with an impermeable liner. The secondary containment volume will be designed to no less than 110% of the tank volume. Loading and offloading connections will be located over secondary containment (7-10).

If permanently manned, domestic sewage from the pigging station will either be treated on or off-site (D5-080). However, it should be noted that the quantities generated will be very low, as there are generally only two security guards stationed at the block valves and two guards plus visiting maintenance staff at the pigging station.

10.5.4.2 Proposed pipeline construction and commissioning, including pigging station, block valves, construction camps, pipe storage areas and rail spur and offloading areas

Sediment release due to run-off from the ROW

The measures that are proposed to control erosion of the ROW will also seek to control sediment run-off and are therefore described in Section 10.3.4.2. Watercourse reinstatement is discussed in Section 10.4.4 and Section 10.7.4. This section therefore only identifies measures of particular relevance to the prevention of surface water pollution, as follows:

Only essential construction vehicles (as approved by the Company) will be allowed to enter rivers or streams and only with prior examination of the vehicles for fuel/lubricant leaks. Generally, the Construction traffic will cross watercourses via a flume/culvert (piped bridge), which will be sized so as not to restrict the flow in the watercourse and allow fish and other aquatic organisms to pass through (10-18).

The ROW will be inspected regularly for signs of erosion and sediment run-off. The Project will undertake increased monitoring for signs of erosion during the two year post construction warranty period at KP321–KP324 and KP344–KP345 (X5-10).

Protection measures will be put in place to prevent any water used for dust suppression from causing silt problems for nearby wetlands or watercourses (10-19).

Disposal of water from trenches and excavations

With regard to the disposal of trench water the following mitigation measures will be applied:

- The Project will aim to avoid the direct discharge of trenchwater to watercourses, except where approved by the Company (10-02)
- The locations for discharge of hydrotest water and where possible trench water, will be identified in the Contractor's Pollution Prevention Implementation Plan (10-03)
- When discharge velocities have the potential to create erosion, energy dissipaters will be used to establish sheet flow. Trenches will be dewatered in such a manner that no heavily silt-laden water flows into any wetland or water body (3-30). The rate of discharge of water will be controlled to reduce the risk of soil erosion (3-17)
- Measures to minimise scour and reduce sediment load will be implemented at locations where hydrotest water or other pumped water (including trenchwater) is discharged to surface watercourses or to land (e.g. controlled rate of discharge and

deployment of geotextile mats or other physical erosion prevention measures) (3-21)

- Water (including hydrotest water) will be tested before discharge and treated to meet the Project Environmental Standards (10-10)
- Sediment reduction measures will be implemented including but not limited to discharge of pumped water via break tanks or sediment mats (10-15)
- If discharge of trenchwater to a watercourse is unavoidable, discharge will be through a filtering medium (10-04)
- At locations where trenchwater or hydrotest water or other pumped water discharges causes scour or soil erosion, eroded areas will be reinstated (3-24).

Sediment release during construction of open-cut crossings
The construction contractor(s) will produce method statements incorporating plans for erosion control, sediment control and reinstatement before work begins at river crossings (4-12). At watercourses, bank and bed material will be stored separately, away from the active channels and will not be placed where flow or drainage will be obstructed (3-23) thereby seeking to reduce the risk of it being washed down-stream.

Daily visual monitoring of turbidity will be undertaken at river crossings while works are being undertaken at that river. This will be supplemented as necessary by probe monitoring (10-16).

The Company will determine whether the water abstraction at the Hasansu is still in existence and if so, will consider if there are potential impacts and agree if mitigation measures are required (X5-19).

Abstraction of water
All new and existing water abstractions for use by the Project will be subject to an environmental and social assessment to assess potential impacts; decisions on the acceptability of the source and appropriate abstraction rates will be based on the results of the review, in accordance with the abstraction permit (15-02).

River flow will be assessed before and during abstraction; abstraction rates will be set taking into account information that the Contractor is able to acquire about downstream users (15-03).

Hydrotest water will be re-used between sections, where practical, to minimise the volume required (10-09).

If water is sourced from rivers or channels no more than 10% of the water flow will be extracted at any time (D5-078). If river flows are not sufficient to abstract water and meet this commitment, the Project will aim to obtain a sufficient quantity of water by reusing water between sections. If this is not feasible then the Project will investigate using water from an existing water pipeline located close to the start of the pipeline (to the east of SCP KP 53).

Surface water contamination from fuels, oils, chemicals, drilling mud used during non-open-cut crossings and hazardous wastes
The general pollution, spill prevention and clean-up, and waste management measures that will be applied during construction are described in Section 10.3.4.2, because they also apply to soil contamination. This section therefore only identifies measures of particular relevance to the prevention of surface water pollution, as follows:

- Washing of Project plant and vehicles in watercourses will not be undertaken (10-22)

- Concrete batching plant (if required) will be sited at least 50m away from sensitive receptors such as watercourses; wash pits to be lined with an impermeable liner (10-01)
- The storage of hazardous materials will be restricted to designated impermeable hazardous materials storage areas located at least 50m from any surface watercourse or seasonal water channel (6-03)
- A refuelling procedure will be developed by the Contractor, which will include a restriction on refuelling within 50m of any watercourse, unless otherwise deemed necessary by Project. Any deviation will be subject to approval by the Company (6-05)
- Any additives proposed to be added to the drilling mud will be subject to an environmental risk assessment before their use is approved by Company (39-06)
- The river crossing contractor will prepare a plan to respond to an outbreak of drilling mud if this occurs during a non-open-cut crossing, including clean up and remediation for outbreak on land and liaison with downstream users in the event of outbreak in the water (7-16)
- Information will be incorporated into the Site induction process and will outline the role of personnel in the management of waste and emissions from site and spill response procedures (7-14).

Surface water contamination – management of hydrotest water
Before hydrotesting, the Contractor will prepare, and submit for Company approval, a hydrotest plan (10-06).

The locations for discharge of hydrotest water and where possible trench water, will be identified in the Contractor's Pollution Prevention Implementation Plan (10-03). Hydrotest water will be re-used between sections, where practical, to minimise the volume required (10-09).

A risk assessment will be undertaken before any chemical additives are used in hydrotest water (10-08). The direct discharge of hydrotest water to watercourses and soakaways will be subject to the results of the chemical risk assessment. The use of evaporation basins will be considered subject to the availability of land and an environmental and social assessment (10-21).

Water (including hydrotest water) will be tested before discharge and treated to meet the Project Environmental Standards (10-10).

Hydrotest water will be treated using diffusers to entrain oxygen in a break tank, and filtration will be used with the aim of minimising suspended solids, prior to discharge. Flow rate will be controlled with the aim of reducing the risk of soil erosion and disturbance to river bed sediment (10-11).

Measures to minimise scour and reduce sediment load will be implemented at locations where hydrotest water or other pumped water (including trenchwater) is discharged to surface watercourses or to land (e.g. controlled rate of discharge and deployment of geotextile mats or other physical erosion prevention measures) (3-21). At locations where trenchwater or hydrotest water or other pumped water discharges causes scour or soil erosion, eroded areas will be reinstated (3-24).

Sediment reduction measures will be implemented including but not limited to discharge of pumped water via break tanks or sediment mats (10-15).

Production and disposal of sewage and wastewater
Waste water will be reduced by efficient use of raw water and the implementation of water management schemes that require water to be reused, whenever practicable, prior to treatment and disposal (14-04).

A risk assessment will be undertaken when considering waste water discharge options and locations (31.05).

The camps will discharge domestic wastewater treated by a sewage treatment package designed to meet the Project standards and permit requirements (D5-106).

The applicable discharge permits will be obtained for any new planned liquid discharges, prior to the discharge commencing (14-09).

All wastewater discharges will be undertaken in compliance with the Project Environmental Standards (14-06); see Appendix B of the ESMMP for details (the ESMMP is Appendix D of the ESIA).

Periodic analysis will be undertaken of controlled stormwater, sanitary and industrial discharges and any receiving surface water upstream and downstream of the discharge point (14-08).

Relevant training will be provided to those with responsibilities for monitoring of effluent discharges and emissions such as effluent sample taking and chain of custody (7-13).

Temporary damming of watercourses leading to impeded flow
Construction design of river and stream crossings will seek to ensure minimal interruption to flow by using measures such as pumping, channel diversions and fluming (11-02). If temporary damming is required, a pre-construction engineering, social and environmental review will be undertaken with the aim of planning the work to minimise the duration of the flow interruption and determining the need for pump around to maintain flows (11-03). Construction of the surface water crossings will seek to ensure minimal impacts from interrupting river flow by identifying downstream users and determining their river water supply needs (11-01). Any temporary dams in watercourses to be removed as soon as pipe installation and reinstatement at that crossing is complete (11-04).

10.5.4.3 In the operations phase

The watercourses on the SCPX pipeline will be incorporated into the existing programme of inspection and maintenance of the watercourse crossings in respect of erosion control (OP142). This comprises:

- An expert assessment of burial depths, set back measurements and pipeline protection works will be carried out at major river crossings annually (depending on the river characteristics and crossing technique) and after flood events exceeding a 1:100-year return period (OP143)
- ROW patrols will monitor river crossings to provide assurance of the integrity of any river protection works and riverbanks. This will include a visual inspection for riverbank erosion or changes to channel morphology (OP131).

In addition, existing liaison with gravel extraction companies will continue with the aim of ameliorating effects of the extraction works on the SCPX and existing BTC, SCP and WREP crossings at the Kurekchay, Shamkirchay, Zeyamchay and Tovuzchay (X5-16).

In respect of any additional bank reinforcement at watercourses, should this be needed during operations, this will be managed in accordance with OP19, which states that should there be any significant changes to the operations of SCPX such as increased throughput,

environmental policies and standards shall be considered as an integral part of any engineering assessment. This will be achieved through the Management of Change system.

If permanently manned, domestic sewage from the pigging station will either be treated on or off-site (D5-080). The applicable discharge permits will be obtained for any new planned liquid discharges, prior to the discharge commencing (14-09). All wastewater discharges will be undertaken in compliance with the Project Environmental Standards (14-06), see Appendix B of the ESMMP for details (the ESMMP is Appendix D of the ESIA).

A monitoring programme will be developed for sanitary and industrial discharges, which will be monitored at the point of discharge to confirm compliance with the Project Standards. Monitoring will be carried out monthly for the first year of operation, after which the frequency and suite of determinants will be reviewed and revised dependent on the on the first year's results (OP41).

An ambient surface water monitoring programme will be developed during operations for waters that receive discharges from the facilities. Monitoring will be carried out monthly for the first year of operation upstream and downstream of the discharge point, after which the frequency and suite of determinants will be reviewed and revised dependent on the first year's results (OP43).

Relevant training will be provided to those with responsibilities for monitoring of effluent discharges and emissions such as effluent sample taking and chain of custody (7-13).

10.5.5 Residual Impacts on Surface Water Resources

10.5.5.1 Proposed pipeline construction including block valves and 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 SCPX route 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 rivers 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 and drilling/tunnelling mud break-out 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 from the major watercourses crossed by the SCPX route, perhaps due to poor pre-existing water quality, with the exception of the Kura River and the Karabakh canal. However, as described in Section 10.5.2, the Shamkir reservoir is 7km downstream from the Kura West crossing, and therefore no significant risk to this supply is predicted.

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.

10.5.5.2 Proposed construction camps, pipe storage areas and rail spur and offloading areas

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

The residual impact of sediment run-off on sediment levels in watercourses is also predicted to be low.

10.5.5.3 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 and BVRs 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 and BVRs.

10.6 Groundwater Resources

This section discusses potential impacts on groundwater during construction and operation of the proposed SCPX Project and associated mitigation measures to be adopted.

10.6.1 Aspects of SCPX Project that Could Affect Groundwater Resources

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

- Temporary abstraction of water for use at construction camps which could deplete groundwater resources and impact other users
- Contamination (due to increase in suspended solid content) of groundwater by drilling fluids or leaching of drilling cuttings if wells are drilled for abstraction at construction camps
- Contamination caused by break-out of drilling mud into aquifers during drilling of non-open-cut crossings
- Accidental release of potential contaminants (e.g. fuel, hazardous waste, chemicals) during pipeline, pigging station and BVR construction or at the construction camp, pipe storage areas and rail spur and offloading areas
- Disruption or impedance of groundwater flows in shallow groundwater areas during trenching
- Concrete batch plants and concrete pours could contaminate groundwater with high pH fluids if not properly managed
- 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 construction camps and 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 SCPX route with respect to groundwater are as follows:

- Groundwater east of the Yevlakh area (KP0–approx. KP162) generally has a low importance and sensitivity, is largely non-potable and not exploited. 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 villagers in this arid region because fresh groundwater reserves are scarce
- Groundwater is generally shallow and heavily exploited for potable and irrigation use to the west of the Yevlakh area (approx. KP162-KP390) and therefore is likely to generally have a high to very high importance and high sensitivity. The value of the aquifer increases further west, as the groundwater becomes progressively fresher
- Groundwater in the Garayazi aquifer, to the west of the Kura West River crossing (KP358–KP390) is considered to have a very high importance and sensitivity. It is particularly vulnerable due to its shallow nature and highly permeable overlying strata and is exploited for potable and irrigation use. It also supports the Garayazi wetland, which forms part of the internationally protected Garayazi State Nature Reserve, an IUCN Category Ia Reserve, see Section 7.6.5 for information on this area.

10.6.3 Impacts on Groundwater

10.6.3.1 Proposed pipeline construction and commissioning, including pigging station and block valves

Groundwater quality

Contamination of groundwater can make water drawn from wells unsuitable for use as potable water or irrigation water. The important factors when determining the magnitude or likelihood of an impact on groundwater are the:

- Nature and quality of any spill, discharge or leak
- Type and thickness of the overburden (including porosity and permeability)
- Depth of the water table
- Rock type
- Aquifer thickness
- Attenuation properties of the aquifer (i.e. the ability of the aquifer to dilute and disperse any spill).

Construction of the SCPX Project will involve the use/generation of some or all of the following materials that have the potential to contaminate groundwater:

- Fuels and lubricating oils
- Drilling fluids and drilling cuttings
- Paints and solvents
- Hydrotest chemicals (e.g. biocides, oxygen scavengers and corrosion inhibitors)
- High pH run-off from concrete batching areas
- Leachate from hazardous waste storage areas
- Raw sewage.

The areas along the pipeline route 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. The sensitivity of the groundwater has been detailed in Section 10.6.2, and this illustrates that the vulnerability to impact increases further west along the pipeline route, as does intensity of usage for irrigation and potable purposes. Therefore, the main impacts are likely to be from the Yevlakh area (approx. KP162) westwards. The area of highest sensitivity is the Garayazi Aquifer (KP358-KP390) area due to groundwater vulnerability.

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
New boreholes may be needed to provide water at construction camps. There is also the potential for mains water and bottled water to be used if available.

Abstraction of groundwater to supply construction camps temporarily depresses the water table in the vicinity of the well. The extent of the radius of influence depends on the transmissivity and storage properties of the aquifer and on the recharge to the aquifer. Drawdown may have an adverse secondary impact on the yield of nearby boreholes, wells, springs and karizes, at least until abstraction ceases. Poorer sections of the community that rely on such water sources are especially vulnerable if lowering of the groundwater levels affects their water supply. Wetland ecosystems are harmed if groundwater levels fall low enough for the soil to dry out. This would be a particular issue for the Garayazi wetland, part of the Garayazi State Nature Reserve, which is likely to be fed by the Garayazi Aquifer (KP358-KP390). However, it is not anticipated that construction camps will be needed in this area, so this impact is unlikely to occur.

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.

Impacts on groundwater availability may also 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).

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.

[1] Groundwater vulnerability is defined as the tendency and likelihood for general contaminants to reach the water table after introduction at the ground surface.

10.6.3.2 Proposed construction camps, pipe storage areas and rail spur and offloading areas

Sewage, wastewater from canteens and bathrooms and potentially contaminated surface water from vehicle wash down areas, roads and hardstanding will be produced and will need appropriate treatment and disposal. The potential impacts of this are the same as those described in Section 10.6.3.1.

The Saloghlu Rail Spur and Offloading Area, camp and pipe storage area are within the Garayazi Aquifer.

10.6.3.3 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 or the proposed BVR sites (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 up flow direction and cause areas to dry out down flow direction. Potential impacts are as per those identified in Section 10.6.3.1.

10.6.3.4 Impact summary and assessment of significance

Table 10-9 provides an assessment of the likely significance of generic ground water impacts before and after implementation of the proposed mitigation measures. Table 10-10 identifies impacts at particular sensitive receptors. Mitigation measures are then discussed in Section 10.6.4.

Table 10-9: Potential Generic Impacts on Groundwater

Issue		Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
A7	Production and disposal of solid and liquid waste	Potential for groundwater contamination if disposal uncontrolled	E5 High	See Section 10.3.4 and Section 10.5.4	E1 Low
A14	Production and disposal of sewage and wastewater	Groundwater contamination	A-C3 Low to Medium	14-04, 14-06, 14-08, 14-09, 7-13, 31-05, D5-080, D5-106, OP41	A-C1 Low
A15	Abstraction of groundwater (if needed at construction camps)	Reduced water quality or quantity from established springs, wells etc.	C2 Low	15-01, 15-02, 15-04, 15-05, 15-07, OP47, 15-09	C1 Low
		Reduced availability of groundwater and surface water sources such as springs for local users	D2 Medium		D1 Low
A16	Altered drainage pattern	Trench can act as conduit for groundwater, draining higher areas and flooding lower areas.	C4-5 High	2-05, 3-07	C1 Low

Issue		Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
A39	Storage of chemicals, oil, fuel, accidental spills and mud break-out during drilling of non-open-cut crossings	Potential for groundwater contamination due to spills or leaks	C-E4 Medium-High	6-03 to 6-12, 6-20, 6-21, 10-01, 14-03, 39-06, 7-10 to 7-14, 7-16	C-E1 Low

* assessed using Tables 3-9 and 3-10

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

Location	Issue	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
West of Yevlakh section of the ROW (KP169–KP390)	Groundwater is close to surface (less than 1–1.5m), abstracted for potable and agricultural use	Potential contamination of groundwater by spills during construction	D4 High	See A7, A14, A15, A16, A39 X6-01	D1 Low
Garayazi aquifer (KP358–KP390), Saloghlu Rail Spur and Offloading Area, Saloghlu Camp and Saloghlu Pipe Storage Area	Groundwater is close to surface, vulnerability is high and is in hydraulic continuity with Garayazi Wetland, part of the Garayazi State Nature Reserve (IUCN Cat 1a)	Groundwater resource and Garayazi Wetland is at risk of contamination by spills during construction	E4 High	See A7, A14, A15, A16, A39 X6-01	E2 Medium

* assessed using Tables 3-9 and 3-10

10.6.4 Mitigation of Impacts on Groundwater

The impact avoidance and mitigation measures summarised below will be applied to planned activities that could contaminate groundwater, abstract groundwater or affect the flow of groundwater.

10.6.4.1 At the design stage

If permanently manned, domestic sewage from the pigging station will either be treated on or off-site (D5-080). A risk assessment will be undertaken when considering waste water discharge options and locations (31-05).

10.6.4.2 Proposed pipeline construction and commissioning, including pigging station, block valves, construction camps, pipe storage areas and rail spur and offloading areas

Groundwater quality

General mitigations for impacts on groundwater quality are outlined in Section 10.3, Soils and Ground Conditions, as they are also applicable to soil contamination. These mitigation measures are therefore not discussed further in this section. However, the following measures, of particular relevance to groundwater protection, are highlighted below:

A site-specific risk assessment of the potential for impacts on groundwater will be undertaken if it is proposed to have static hazardous waste, chemical or fuel tanks at KP32 or between KP169 and KP390 (which includes the Garayazi aquifer from KP358 to KP390) during construction, or at the Saloghlu Rail Spur and Offloading Area, Saloghlu Pipe Storage Area and Saloghlu Camp during construction. This will be used to develop any additional mitigation measures required (X6-01).

In areas of wetland and areas where the groundwater supplies wells for irrigation or potable use, the storage and use of hazardous materials will be carefully controlled (14-03).

In relation to drilling muds:

- Any additives proposed to be added to the drilling mud will be subject to an environmental risk assessment before their use is approved by the Company (39-06)
- The river crossing contractor will prepare a plan to respond to an outbreak of drilling mud if this occurs during a non-open-cut crossing, including clean up and remediation for outbreak on land and liaison with downstream users in the event of outbreak in the water (7-16).

Concrete batching plant (if required) will be sited at least 50m away from sensitive receptors such as watercourses; wash pits to be lined with an impermeable liner (10-01).

Abstraction
All new and existing water abstractions for use by the Project will be subject to an environmental and social assessment to assess potential impacts; decisions on the acceptability of the source and appropriate abstraction rates will be based on the results of the review, in accordance with the abstraction permit (15-02). The abstraction borehole, when completed, will be test pumped and a sustainable yield will be determined together with aquifer characteristics such as hydraulic conductivity and radius of influence (15-04). Water features such as abstractions (boreholes, wells, springs) or environmental features (wetlands, springs, streams or surface water features in continuity with groundwater) will be identified within the likely radius of influence of the abstraction point (15-05).

All necessary permits/consents to drill and abstract groundwater will be obtained before water is abstracted for construction or domestic use. Groundwater will not be used for pipeline hydrotesting (15-01).

If groundwater is extracted for Project use, from either new or existing boreholes at temporary facilities, the water quality and sustainability will be monitored periodically to confirm that the supply meets Project standards and does not impact adversely on other known users (15-09).

Water conservation initiatives will be undertaken at construction camps (15-07).

Implementation of the various mitigation measures are intended to assure, as well as reducing primary impacts, that any secondary impacts do not occur.

Groundwater flows
Backfill will be adequately (but not excessively) compacted to prevent future settlement (2-05). Trench breakers will be installed where downhill flow within the backfilled trench may lead to erosion (3-07). This will seek to prevent the backfilled pipeline becoming a drainage conduit.

10.6.4.3 In the operations phase

The trench breakers installed in the pipe trench during construction are intended to prevent the pipeline acting as a conduit for groundwater.

Groundwater quality monitoring will be carried out subsequent to any unplanned events which are assessed as having the potential to impact groundwater quality (OP47).

With regard to any potential wastewater discharges at the pigging station:

- The applicable discharge permits will be obtained for any new planned liquid discharges, prior to the discharge commencing (14-09)
- All wastewater discharges will be undertaken in compliance with the Project Environmental Standards (14-06)
- A monitoring programme will be developed for sanitary and industrial discharges, which will be monitored at the point of discharge to confirm compliance with the Project Standards. Monitoring will be carried out monthly for the first year of operation, after which the frequency and suite of determinants will be reviewed and revised dependent on the on the first year's results (OP41).

Relevant training will be provided to those with responsibilities for monitoring of effluent discharges and emissions such as effluent sample taking and chain of custody (7-13).

10.6.5 Residual Impacts on Groundwater

If the proposed mitigation measures are implemented, the residual impacts on groundwater are considered low, with the exception of potential impacts to the Garayazi Aquifer where they are considered medium, but only in the unlikely event that a significant spill occurred.

10.7 Ecology

This section discusses potential impacts on flora and fauna during construction and operation of the SCPX Project and associated mitigation measures to be adopted.

10.7.1 Aspects of SCPX Project that Could Affect Ecology

The following planned Project activities could affect habitats and/or disturb fauna in the Project area during construction and commissioning:

- Clearance of vegetation and soil from the ROW, camp, pipe storage areas and rail spur and offloading areas, new or widened temporary access roads, pigging station and BVR sites
- Construction of any necessary borrow pits
- Storage of soil from ROW, trench, pigging station and BVR sites
- Pipe stringing
- Trench excavation
- Disposal of surplus soil from the pipeline trench
- Use of plant and vehicles on the ROW, at the camp, pipe storage areas and rail spur and offloading areas, pigging station and BVRs
- Use of equipment that generates noise on the ROW, at the camp, pipe storage areas, rail spur and offloading areas and at the pigging station and BVR sites (e.g. compressors, generators, turbines)
- Lighting on the ROW, at camp, pipe storage areas, rail spur and offloading areas and at the pigging station and BVR sites
- 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 pigging station and BVR sites
- 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 and BVRs.

10.7.2 Key Sensitivities

The main ecological receptors that could be affected by the construction and operation of the SCPX Project 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 pipeline route passes through several terrestrial ecosystems, from clayey and solonchak deserts in the east, to steppe-like semi-desert in the west. Much of the land crossed by the pipeline route (61%) is used for agriculture and it is not sensitive to significant ecological impacts beyond those resulting from the existing land use (which often involves annual tilling of the soil and replacement of the vegetation). Semi-natural habitats (i.e. non-agricultural areas) in the eastern part of the route are typically species-poor but vulnerable to soil compaction and vegetation cover may not recover quickly following disturbance. Semi-natural habitats in the western part of the route are typically less sensitive to soil compaction but have high plant species-diversity (e.g. Photograph 10-7) and this aspect can be slow to recover following disturbance.

Photograph 10-7: *Nigella arvensis* (Love-in-a-Mist), a Wildflower of Species-Rich Semi-desert Vegetation at the Western End of the Route, where the Re-instatement of Species Diversity is a High Priority

In addition to the terrestrial habitats, some of the rivers crossed by the route are sensitive to disturbance, particularly the rivers that have habitat suitable for spawning fish (including species included or proposed to be included in the Azerbaijan RDB) and those that have steep, erodible banks. There are also a number of rare animals that are known to be present or are quite likely to be present along the route that are vulnerable to direct and indirect impacts. A list of these is given in Table 7-51, Section 7.7.9.4.

The following list provides a summary of the key sensitivities:

- Terrestrial habitats sensitive to soil compaction and slow recovery of vegetation cover typically in the eastern part of the route in discrete sections between KP0 and KP158.1; four areas in particular have been identified (KP0-KP3.2, KP5-KP24, KP85-KP96 and KP138-KP158.1), see Table 7-48, Section 7.7.9.1 for further details)
- Terrestrial habitats with high plant species-richness sensitive to slow recovery of species-diversity in the western part of the route between KP321 and KP390, where the topsoil is shallow, see Section 10.3.3.1), potentially supporting RDB plant species. Six such areas have been identified: KP321–KP322.9, KP335.4–KP336.4, KP342–KP346, KP346.1–KP351, KP358.8–KP369.8 and KP382.8–KP390, see Table 7-48, Section 7.7.9.1 for further details
- RDB plant species known to occur on the ROW (*Iris camillae*) or potentially occurring there (there is suitable habitat for *Iris acutiloba* between KP0 and KP35) and there is an unconfirmed sighting of Iris at Ujar Camp Option 5
- Fish in rivers (including some RDB and potentially some IUCN Red List species), particularly vulnerable during spawning – typically April to July depending on seasonality – the sensitivity and importance of the rivers crossed for fish is discussed in Section 7.7.9.2

- River-bank-nesting fauna (e.g. otter (*Lutra lutra*) – RDB, IUCN NT[2]), particularly vulnerable in the breeding season, which is typically April to July depending on seasonality
- Reptiles and amphibians associated with rivers, streams and degraded wetland crossed by the proposed pipeline route (including some RDB and IUCN Red List species such as common toad (*Bufo bufo*) – RDB, eastern spadefoot toad (*Pelobates syriacus*) – RDB, and European pond terrapin (*Emys orbicularis*) – IUCN NT, 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 occurs widely along the route
- 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) – RDB, and wintering birds such as *Tetrax tetrax* (little bustard) – RDB, IUCN NT
- The pipeline does not cross any areas protected for ecological reasons but is close to several and the Saloghlu Pipe Storage Area is adjacent to a protected area, see Chapter 7, Table 7-29. Goitered gazelle from the Korchay State Nature Reserve may cross the pipeline route as part of their daily movements or during seasonal migration.

10.7.3 Impacts on Ecological Resources

10.7.3.1 Proposed pipeline construction and commissioning, including pigging station and block valves

Habitats and plant species

Pipeline construction will affect approximately 152km of non-agricultural land and fourteen areas designated as Forest Fund Land. (The remaining 235km of the route is agricultural land of little ecological value.) Clearing vegetation and soil, and spreading or piling soil over vegetated areas, will cause temporary habitat loss. In addition, there will be a small loss of habitat where new temporary access roads are created or existing roads widened. Potential impacts on habitats associated with this habitat loss include localised reduction of biodiversity, habitat severance and an increase in edge-effects such as dominance by ruderal plant species. Habitat structure will also be affected as the majority of characteristic woody sub-shrubs (e.g. *Artemisia fragrans*) will be lost during the process of soil handling and reinstatement, and they will have to re-grow from fragments or from seeds. Three-dimensional structure is an important feature of the habitats crossed by the proposed route. The woody sub-shrubs play an important part in habitat function through regulation of microclimate, helping to bond topsoil with their roots, and improving infiltration of precipitation.

Poor soil handling, soil erosion, soil compaction and poor disposal of surplus sub-soil could all reduce soil fertility, soil depth and soil structure which could, in turn, impact on the ability of the vegetation to recover naturally after the topsoil has been replaced. Poor storage and handling of topsoil could also result in the loss of some of the live plant material (seeds, rhizomes, bulbs, tubers etc), which is crucial for successful recovery of natural vegetation. This topic is covered in Section 10.3. Once stripped, topsoil stacks could become colonised by semi-ruderal species such as *Silybum marianum* (milk thistle). If left untreated, these species could build up in the seed bank and limit the success of biorestoration. There is also the potential for non-native species imported on construction plant/vehicles and in seed mixes (if present) to establish leading to secondary impacts on habitats.

[2] IUCN Red List categories describe the level of threat to a species' global population. Starting from lowest to highest level of threat: LC = Least Concern; NT = Near Threatened; VU = Vulnerable; EN = Endangered; CR = Critically Endangered; EW = Extinct in the Wild; and EX = Extinct.

Pollution of soil and groundwater by discharging wastewater and waste can cause mortality of vegetation.

Pipeline construction between KP0 and KP35 could result in the loss of *Iris acutiloba* if any are growing on the ROW in this location. There is a population of *Iris camillae* on the ROW between KP346 and KP347, consisting of around 90-150 plants that would be lost in the absence of mitigation. This species may occur elsewhere in the region but it has not been recorded elsewhere on the ROW. Construction along this section could therefore result in the loss of a substantial proportion of the local population.

Photograph 10-8: Recording the Location of Populations of the RDB Plant Species *Iris camillae* during Baseline Surveys for SCPX in June 2011, near the Hasansu River Valley at KP347

Protected areas

The Barda State Nature Sanctuary (SNS), which is designated because it is an area of tugay forest supporting birds and mammals (in particular pheasants, black francolin and hares), is approximately 5km downstream of the Kura River (east) crossing. However, the SCPX route does not affect any tugay forest. Any short-term spills or releases into the river would be very unlikely to have even a negligible effect on the tugay forest. The animals in the Barda SNS are unlikely to be sensitive to direct effects from pipeline construction, as the reserve is 5km away and at this distance any noise, light or dust (typically the most important indirect effects on animals) are unlikely to be significant. At the Kura East crossing the pipeline passes through agricultural land which, given the distance and isolation from the Barda SNS, is unlikely to support large numbers of nesting francolins or pheasants but could be used by individuals or small numbers of birds. The temporary effects of pipeline construction are highly unlikely to affect the population of the species for which the reserve is designated.

The route passes within 2.5km of the Korchay State Nature Reserve, which is designated for the conservation of goitered gazelle (*Gazella subgutturosa*). There is no up-to-date information available on the population of this species in the reserve, and whether they are resident here or whether they migrate to and from the reserve annually (see Schmidt.S., &

Pietzsch D. (2007) for the latest information[3]). The route does not cross any habitats that are likely to be of critical importance to this species, being mostly located in arable land. However, it is possible that, in the absence of mitigation, the construction phase could present a temporary barrier to movement of this species particularly in winter as herds are estimated to cover 10–30km per day in the winter and 1–3km in summer.

The route passes within 1.3km of the Shamkir SNS, which is designated for the conservation of black francolin, pheasants, partridge and waterfowl. The pipeline route crosses agricultural land outside the reserve that is unlikely to be of critical importance to these species. These birds may be found on the land crossed by the pipeline route in small numbers but the temporary nature of pipeline construction, combined with the measures that will be taken to avoid impacts on nesting birds during construction, mean that it is very unlikely that the SCPX will have a significant effect on the local population of these species.

The route also passes very close (*c.*1km) to the Garayazi protected area (IUCN Management Category IV and State Nature Sanctuary, which is contiguous with the Garayazi protected area (IUCN Management Category Ia and State Nature Reserve), which is upstream of the SCPX crossing point on the Kura West River. This protected area is also designated for its Tugay forest. However, as noted above, the SCPX route does not cross any Tugay forest, and it is extremely unlikely that any spills or releases into the river would affect the SNS, which is upstream of the crossing point. West of the crossing point, the riparian and floodplain habitats form a fairly wide corridor of semi-natural habitats up to 2.5km wide. This narrows up to and beyond (eastwards from) the crossing point. The crossing point does not pass through any semi-natural habitats, so it is unlikely to be important for the animal species that use the SNS. It crosses through land already cleared for the BTC crossing point and therefore will not have an additional effect on habitat connectivity.

The Saloghlu Pipe Storage Area is adjacent to the Garayazi-Agstafa protected area but does not contain any Tugay forest. Mitigation measures to reduce any potential impact caused by light and noise are discussed in Chapter 10.

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

Eleven main rivers and a large number of smaller mainly unnamed watercourses will be crossed using open-cut crossing methods (see Section 5.6.1 for a description of crossing methods for the main rivers and Table 10-11 for a list of the main rivers that will be crossed using open-cut techniques). Open-cut crossing methods have the potential to impact on river ecology during the construction phase. The scale and duration of the impact will depend on the size of the watercourse, the habitat types present, the species present, the timing of works and the precise methods employed.

All of the rivers that will be open-cut have potential to support fish species that are either RDB species or IUCN Red List species. Whilst these species were not recorded from all of the rivers, the surveys only provide a snapshot of the fish fauna at the time of survey, and due to the broad similarity and inter-connectedness of the rivers, it is possible that these species could be found in any of the open-cut rivers. The main potential impacts on fish from construction of pipeline river crossings include:

[3] Schmidt.S., & Pietzsch D. (2007). Contributions to the number of a Gazella subgutturosa subgutturosa population in Shirvan National Park, Azerbaijan. *Archiv fur Naturschutz und Landschaftsforschung*

- Creating a (temporary or permanent) barrier to the movement of fish and other wildlife (e.g. upstream migration to spawning areas and downstream migration to feeding area)
- Loss of fish eggs and other benthic fauna at the crossing point
- Degradation of fish spawning habitat at and downstream of the crossing point
- Sediment release leading to lethal or sub-lethal effects on fish and other aquatic organisms.

Open-cut pipeline crossings of rivers can potentially create a temporary barrier to fish movement during construction, and also have the potential to create a long-term barrier to fish movement after construction. Some fish migrate from rivers to the sea, whilst other species migrate up and down the freshwater sections of rivers throughout their lifetime, moving from fast-flowing headwaters to calm downstream waters. Poorly installed pipelines and other crossing structures (such as hard bed reinforcement to combat erosion and temporary flume pipe crossings/bridges installed to allow construction plant and machinery to cross over the river without entering the watercourse) can create barriers to these natural movements. This can result in the isolation of meta-populations up and downstream of the crossing point, reduced breeding success or loss of migratory species from sections of the river.

The fish-spawning season typically occurs between April and July, with peak spawning activity most likely to occur between May and June (depending on seasonality). Spawning activity is likely to tail off towards the end of the season, as water levels drop and the rivers begin to dry up. Therefore, the most sensitive period for construction of open-cut river crossings in relation to spawning fish is between April and July. Large amounts of sediment released into the river at this time could have a large impact on fish populations. Excavating a crossing trench through potential spawning habitat during the spawning season could lead to the direct loss of fish eggs or young. If there is spawning habitat downstream of the crossing then sediment released during trenching or backfilling could smother fish eggs and other benthic fauna.

Sediment released outside of the spawning season could also have impacts on spawning fish. Fish eggs are typically released into the water stream or laid over gravel beds, and the structure of the sediment, along with water quality, is an important factor in determining the suitability of a river for successful spawning. Sediment released into a river can reduce the suitability of habitat for fish spawning by reducing the three-dimensional complexity of the bed (e.g. covering gravels in a fine layer of silt). The impact of this on spawning fish is likely to be smaller in magnitude than a release of sediment during the spawning season, as over time silt is washed away and the spawning habitat recovers. Some examinations of the impacts of pipeline crossings on fish spawning habitat have shown that this can occur within one year or less[4].

Sediment released during trenching or backfilling can also lead to sub-lethal and lethal effects on fish and other aquatic organisms, as well as spawning fish and their habitat. Sub-lethal effects of increased levels of suspended sediment on fish include reduction in prey availability (due to smothering of benthic invertebrates), reduced ability to hunt for prey or avoid predators (due to lower visibility) and effects on health such as clogging of gills. Sub-lethal effects typically occur in the range of tens to hundreds of mg-L^1, and lethal effects typically occur in the range of hundreds to hundreds of thousands of mg-L^1. However, the rivers crossed by the proposed route naturally have quite high levels of suspended sediment, particularly during periods of high flow (May and June). Large variation in suspended sediment levels were recorded during the 2011 surface water surveys, but most

[4] Reid, S.M., Stoklosar, S., Metikosh, S. and Evans, J. (2002). Effectiveness of Isolated Pipeline Crossing Techniques to Mitigate Sediment Impacts on Brook Trout Streams. *Water Qual. Res. J. Canada,* 2002, Volume 37, No. 2, 473–488.

rivers had levels between 40 and 120mg/l in the high flow recordings and three rivers had suspended sediment in excess of 1,000mg/l (mean levels were 99mg/l in high flow and 294mg/l in low flow). Fish living in rivers with high variability in suspended sediment levels are typically well adapted to short-term variations (i.e. increases over a few days), so to have an impact on fish and other aquatic organisms, suspended sediment would have to be raised above these levels or continue for a prolonged period.

According to a review by Reid and Anderson[5] of pipeline crossings of seven rivers in the United States, suspended sediment levels downstream of crossings ranged between 503mg/l and 2,960mg/l (mean = 1,326mg/l). There was a large range in the data and the concentrations were highly dependent on the distance of the measurements downstream from the crossing.

The increase in suspended sediment resulting from pipeline crossings is highly dependent on the techniques used. For example Reid et al (2002)[6] monitored total suspended sediment downstream of isolated crossings (using dam and pump and flume techniques) and found that, aside from installing and removing the isolation structures, suspended sediment levels downstream of the crossing were at least seven times lower than open-cut crossings of similar sized watercourses.

Open-cut crossings are typically completed over a course of a few days, so any increased levels in suspended sediments would only be short term. As a proportion of the total and average movement of sediment in these rivers, the amount of sediment mobilised by construction is likely to be small and short term. These estimates are subject to a large number of un-calculated variables and should be treated with caution and consideration of the variables discussed here in regard to timing of animals' behaviour and the behaviour of sediments released into flowing water. They do however provide a guide to the likely scale of any impact, such that the potential impacts on fish and aquatic organisms from release of suspended sediment are likely to be small unless the levels released are many times greater than the background levels, coincide with the fish spawning season and are distributed into fish spawning habitat.

The rivers most at risk from these potential impacts on fish and spawning habitat are those that will be open-cut and which have potential to support important fish species, especially during the spawning season. A list of these is provided in Table 10-11.

Table 10-11: Rivers Likely to be Open-cut and Most at Risk of Significant Impacts on Important Fish Species

River Name	SCPX KP	Overall Ecological Importance/Sensitivity
Kurekchay	221	Medium
Ganjachay	240	Medium
Goshgarachay	261	Medium
Shamkirchay	277	Medium

[5] Reid S.M. and Anderson P.G. (1998). Suspended Sediment and Turbidity Restrictions Associated with Instream Construction Activities in the United States: An Assessment of Biological Relevance. *Proceedings of the International Pipeline Conference, American Society of Mechanical Engineers,* Calgary, Alberta, June 10-14, 1998, pp. 1035-1040.

[6] Reid, S.M., Stoklosar, S., Metikosh, S. and Evans, J. (2002). Effectiveness of Isolated Pipeline Crossing Techniques to Mitigate Sediment Impacts on Brook Trout Streams. *Water Qual. Res. J. Canada*, 2002, Volume 37, No. 2, 473–488.

River Name	SCPX KP	Overall Ecological Importance/Sensitivity
Zeyamchay	303	Medium
Asrikchay	323	Medium
Tovuzchay	324	Medium
Hasansu	345	Medium
Kurudere	369	Medium

Excluded from this list are the Goranchay (which comprises a line of scrub with very little habitat for fish) and the Korchay and Sarisu, which are very small watercourses at the crossing points.

It is possible that additional sediment could enter watercourses due to run-off from the ROW (which may be more vulnerable to wind and water soil erosion following topsoil removal during construction and following topsoil replacement, when the vegetation has yet to recover). The total potential amount of sediment that could enter the watercourses from this source is considered likely to be small in comparison with the natural levels of sediment borne in the water, particularly during the periods of high flow. This potential impact will be mitigated in the long term by the process of biorestoration of the ROW and the other control measures in place to avoid surface soil erosion. In consideration of the scale of potential effect and the high levels of natural suspended sediment this impact is therefore only likely to be small and short-term and would not be expected to have a significant effect on aquatic organisms such as fish.

Abstraction of water from rivers, for example for hydrostatic testing, and discharge of water (such as hydrostatic test water and water from trenches) to rivers has potential direct effects on aquatic biota (particularly fauna) and potential effects on water quality leading to secondary effects on aquatic biota. During abstraction there would potentially be a risk of picking up aquatic biota such as fish and temporarily or permanently removing them from the water. There is an increased risk to fish populations if water abstraction is carried out during the spawning period when very young fish could be extracted in large numbers. If trench water and hydrotest water is discharged to watercourses there could be a potential impact from increased suspended sediment levels (through scour or soil erosion). The potential effects of this are discussed above in relation to potential impacts of open-cut river crossings.

During non-open-cut river crossings there is a risk of drilling mud break-out. Drilling muds will be water based, and any additives used in drilling mud will be subject to a risk assessment before they are used, which will include an assessment of potential impacts on river biota. This will include an assessment of potential short-term toxic effects (if any) or long-term bioaccumulation. The primary risk from mud outbreak is an increase in suspended sediment in the water column that could, in turn, have secondary impacts on fish. As discussed above, the potential ecological impacts of this are likely to be small in consideration of the high natural levels of suspended sediments in the rivers. Should break-out occur, an appropriate response plan will be implemented.

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.

Several rivers are suitable for *Lutra lutra* (Eurasian otter – pRDB, NT), although this species has not been recorded during surveys of the proposed route. 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[7]. 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. They are vulnerable to disturbance during the breeding season, and typically a buffer zone of at least 20m away from a holt would be implemented to avoid disturbance, although this depends on the activity and the precise topography of the land.

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.

Movements of riparian species
Non-open-cut crossings will not result in a barrier to movement for riparian species. Despite works potentially continuing into the night, resulting in increased illumination of an area, the watercourse will remain available for use as a foraging and commuting route for all 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*) will not be able to travel along the watercourse at the construction location. 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*) – pRDB
- Greater horseshoe Bat (*Rhinolophus ferrumequinum*) – pRDB
- Lesser horseshoe bat (*Rhinolophus hipposideros*) – pRDB
- Botta's serotine bat (*Eptesicus battoae*) – pRDB
- Lesser mouse-eared bat (*Myotis blythii*) – pRDB.

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 stable temperature. 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.

[7] The Eurasian Otter in the South Caucasus, Gorgadze, G., 2004 IUCN Otter Spec. Group Bull. 21(1): 19–23.

The reptile and amphibian species of importance that are known or likely to occur on the proposed route are also found in association with water, i.e. irrigation ditches, canals and rivers and the adjacent riparian habitats (with the exception of *Testudo graeca* (spur-thighed tortoise – VU, RDB) (see Photograph 10-9). The relative sensitivity of the species varies according to their differing lifecycles and biology, but their shared habitat preferences mean they are vulnerable to similar factors. In particular, individual animals are vulnerable to killing or injury when they are in hibernation and less able to move away from disturbance. They are also vulnerable to disturbance during the breeding season and in the spring/summer while moving from terrestrial refuges to aquatic breeding sites and vice-versa. However, because these species are widespread along the route, their populations are unlikely to be affected by short term, small, temporary impacts such as might be experienced during construction. Following reinstatement, the reduced vegetation cover on the ROW may make individual animals more vulnerable to predation, particularly if the route intersects with a regular migration route between terrestrial habitat and breeding sites.

Testudo graeca (spur-thighed tortoise – VU, RDB; Photograph 10-9) inhabits dry open areas, and can be found in most habitats crossed by the proposed route, except for cultivated agricultural land where it is likely to be found only occasionally. Mating begins shortly after the animals emerge from hibernation (around March or April depending on weather), and females may lay several clutches of eggs in a year from spring to summer (nominally between April and July). Adults and eggs are particularly vulnerable during the breeding season, and adults are also vulnerable in winter when they may be hibernating beneath dense vegetation such as at the bases of trees and shrubs. Overall, the species is widespread in the region crossed by the proposed pipeline and therefore population levels are unlikely to be at risk from construction.

Photograph 10-9: *Testudo graeca* (Spur-thighed Tortoise) Sheltering beneath *Artemisia fragrans* in Semi-desert Vegetation on the ROW near KP347

Note: avoiding impacts on this species will be a high priority during construction and operation

There is a risk of terrestrial animals falling into open trenches during construction. Some animals such as the spur-thighed tortoise could become trapped in the open trench, where

they would be at risk from construction activities or, if trapped for a long time, death from predation, starvation or lack of water. Over the course of pipeline construction this would only be likely to affect a small proportion of a local population of any one species and would be unlikely to have a large long term effect on a population beyond a localised area.

The presence of an open pipeline trench and soil mounds could restrict the movement of species across the route. This could have effects on the behaviour of territorial animals, particularly during breeding when some animals (such as amphibians) may follow regularly used routes between hibernation sites and breeding habitat. In consequence, there could be effects on gene-flow amongst meta-populations if this impact was significant and long term (i.e. occurring over more than one generation). Owing to the temporary and localised nature of the pipeline construction, this would be unlikely to have a large or long-term impact on a species' population beyond one generation.

The increased level of vehicle traffic associated with pipeline construction poses an additional risk of mortality to some terrestrial animals. The risk is most pronounced on seldom-used routes (main roads are unlikely to be frequented by large numbers of animals and the background risk is already high). Some species have higher vulnerability than others. For example reptiles may use the open ground created by a vehicle route as a basking site to warm up in the morning. This vulnerability also varies according to the time of day and season: animals are more likely to cross open ground during the mornings or evenings in summer (when temperatures are highest and many species are less active during the day) or during seasonal movements in the breeding season (such as amphibian movements on warm, wet nights). The number of animals killed on roads is unlikely to be large unless vehicle movements were to coincide with the movement of a large number of animals – as these typically occur in evenings or at night when vehicle movements are low or absent, the impact is therefore likely to be small and would not extend beyond one generation.

Temporary lighting on the proposed ROW and at the BVRs and pigging station during construction has the potential to have small, localised impacts on wildlife. Lighting is known to have impacts on nocturnal species such as bats. The effects can be beneficial for some species such as insectivorous bats, because increased amounts of prey are attracted to the lights. However, this can also make them more vulnerable to predation by nocturnal birds such as owls or hawks. Lighting can have negative impacts because some bat species avoid well-lit areas at night, so introducing new lighting has the potential to disrupt bat commuting routes or to deter bats from foraging in an area. Where bat roosts are illuminated by artificial lighting, this can cause bats to delay emerging from the roost in the evening and reduce their foraging ability. However, it is highly unlikely that any bat roosts will be artificially illuminated, as there are very few potential roosting locations on the proposed ROW. As the BVRs and pigging stations are not located on features likely to be used by large numbers of commuting bats (i.e. there are no linear features such as tree-lines) there is unlikely to be an impact on commuting bats, and only a risk of a small impact on foraging bats.

Noise from plant and machinery during construction could result in disturbance of wildlife. This may result in a small displacement effect, but the scale and duration of the impact is highly dependent on a number of factors including the species' sensitivity to noise, existing background levels, local topography and the duration and intensity of noise. The effect of displacement and disturbance could have similar consequences to the potential barrier effect of the open trench by preventing the movement of animals between seasonally occupied sites or the genetic flow amongst meta-populations. As this impact will be localised and temporary it is therefore likely to be small and would not extend beyond one generation.

Accidental spills of chemicals, oils or fuels could have impacts on terrestrial fauna, the most likely of which are direct mortality through exposure to toxic compounds or bioaccumulation of toxic compounds through the food chain. The scale and significance of the impact would be dependent on the type and amount of any particular material spilled, as well as its

location i.e. spills within a construction compound are unlikely to have significant ecological effects, but spills of large amounts of a chemical or oil in natural habitat could lead to a larger ecological impact. In consideration of the quantities and types of materials used during construction, any spill is likely to be quite localised. The direct impacts of mortality would only be likely to affect a very small number of animals (e.g. if the spilled material made direct contact with a sensitive species). The risk of bioaccumulation would only occur if the spill was left untreated and became ingested by a large number of prey species. These impacts are therefore only likely to be high if a spill involved large amounts of toxic material being introduced into a natural environment and being left untreated.

Uncontrolled disposal of solid wastes can have localised impacts on terrestrial fauna. In the case of largely inert solids such as excavated materials, this could have a small impact on terrestrial fauna if they are stored or disposed of into natural habitats. Solid wastes produced from construction camps (e.g. litter and similar materials) can cause mortality of animals if they become trapped in containers (e.g. plastic bottles). These impacts are likely to be small and localised.

Birds
Ground-nesting birds potentially nest in all semi-natural 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 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.

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 to 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 although works to an access road to one of the temporary sites may impact a small wetland area, see Section 10.7.3.2.

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 two rare plant species (*Iris camillae* and *Iris acutiloba*)
- Reduced primary productivity in watercourses, smothering of invertebrates, lethal or sub-lethal effects on fish (including degradation of spawning habitat)
- Disturbance or mortality of riverbank-nesting fauna during the breeding season (nominally April to July) and during the winter hibernation period (nominally October to March) at open-cut river crossings
- 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 Proposed construction camps, pipe storage areas and rail spur and offloading areas

The proposed construction camp, pipe storage areas and rail spur and offloading areas are almost all located in habitats considered to be of low ecological value. Most of the sites are located in cultivated agricultural land or on previously disturbed ground, which is of low ecological value and is not sensitive to significant ecological impacts beyond those resulting from the existing land use (i.e. which often involves annual tilling of the soil and replacement of the vegetation). The exceptions to this are as follows:

- The Saloghlu Pipe Storage Area is very close to the Garayazi-Agstafa protected area (IUCN Management Category IV and State Nature Sanctuary, which is contiguous with the Garayazi protected area (IUCN Management Category Ia and State Nature Reserve. This protected area is designated for its Tugay forest. The pipe storage area does not contain any of the habitats for which the protected area is designated but there is potential for noise, light and dust to affect fauna and flora within the boundary of the protected area. The proposed Kurdemir Pipe Storage Area Option 1 (Mususlu) has been identified as being located in lowland meadow habitat. This vegetation type is considered to be of low ecological value but medium sensitivity to disturbance. Part of Goranboy Camp Option 3 consists of desert habitats that are widespread and of low ecological value but medium sensitivity to disturbance. However, this site was being ploughed for crops when last visited. Ujar Camp Option 5 partly consists of Tamarixetum scrub which is common but slow to recover when disturbed. In the above locations, potential impacts to terrestrial fauna and ground nesting birds could also occur. Several of the preferred camp, pipe storage and rail spur and offloading sites are close to watercourses that may support reptiles and amphibians as well as nesting birds. Trees are present along the boundaries of Goranboy Camp Option 3 and Samukh Camp Option 3 and there is a band of shrubs on the eastern boundary of Ujar Camp Option 5
- The access road associated with Kurdemir Pipe Storage Area Option 1 and 2 (Mususlu) will need upgrading. The aim will be to avoid encroaching into a Phragmiteta-Typhetum wetland area but a worst case assumption has been made that there may be some loss and that this could affect some breeding or overwintering birds as well as amphibians and reptiles. There are two options for the work (A) and (B). Option A may impact on a more valuable part of the wetland. The wetland in this area is of medium importance / sensitivity. Option B would impact on a part of the wetland that has been burnt and may involve the culverting of an irrigation canal and an area of good agricultural land, all of Low ecological importance/sensitivity.

Increased presence of humans in and around camps and along the ROW can lead to increased hunting or gathering of game birds, small mammals (e.g. hares) and wild plants for food or recreation. This can affect local populations of some species. Some wild animals may also be attracted to works areas, such as snakes and reptiles that may shelter underneath plant, machinery or stored materials. If discovered, many of these species are often killed on sight out of fear or habit, due to apprehension about venomous or aggressive animals. This can affect local populations of some species and can occur anywhere on the ROW but the effect is often concentrated at construction camps. Lighting in and around camps has potential to cause both positive and negative impacts on bats, although the effects are likely to be small and localised.

The presence of wastes has the potential to increase vermin levels if not properly stored. This in turn could have the secondary impact of increasing the availability or prey for carnivores.

Surveys to confirm the value of these temporary sites will be undertaken prior to construction, see Section 10.7.4.2.

10.7.3.3 In the operations phase

The proposed new pigging station at KP0 is located in semi-natural desert (Artemisetum salsolosum-nodulosae), a habitat that is considered to be of low ecological value but high

sensitivity to disturbance. Three of the five new Block Valves (BVR A8-A10) are located in agricultural land of low ecological value and sensitivity. The proposed BVR A6 (KP21) is located in Artemisetum salsola-dendroides clayey desert, a habitat of low ecological value and high sensitivity to disturbance. The proposed new BVR A7 (KP95) is located in lowland meadow, a habitat of low value and medium 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 BVRs and pigging station has potential to impact on bats (see Section 10.7.3.1).

10.7.3.4 Impact summary and assessment of significance

Table 10-12 provides an assessment of the likely significance of potential generic impacts on ecological receptors before and after implementation of the proposed mitigation measures that are discussed in the rest of this section. An assessment for particularly sensitive receptors is provided in Table 10-13.

Table 10-12: Potential Generic Impacts on Ecological Receptors

Issue		Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
A2	Soil compaction	Impaired re-establishment of vegetation after construction	D2 Medium	2-01, 2-02, 2-03, 2-04, 2-05, 2-07, 3-09, 3-15, 4-03, 4-06, 17-16, OP61	D1 Low
A3	Soil erosion and sediment run-off following removal of vegetation and/or disturbance of ground	Reduced primary productivity in watercourses, smothering of invertebrates, lethal or sub-lethal effects on fish, degradation of spawning habitat	B3 Low	3-03, 3-05, 3-07, 3-08, 3-09, 3-15, 3-17, 3-23, 3-26, 3-28, 3-32, 3-33, OP142, 4-07, 4-08, 4-09, 4-12, 4-13, 10-11, 10-12, 10-16, 10-19, 17-07, OP143, OP131, OP136	B1 Low
		Impaired recovery of natural vegetation due to erosion by wind or water	B3 Low		B1 Low

Issue		Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
A4	Loss of soil structure, fertility and seed bank	Poor re-colonisation due to anaerobic conditions in stored soil, reduced fertility and loss of entrained seeds	C2 Low	3-11, 4-02, 4-03, 4-04, 4-05, 4-08, 4-09, 4-15, 4-22, D5-086	C1 Low
A7	Production and disposal of solid and liquid waste	Mortality of flora and fauna	B2 Low	6-03 to 6-14, 6-20, 6-21, 19-08 Also refer to Section 10.3.4	B1 Low
		Increase in vermin around waste dumps and consequent increase in prey availability for carnivorous birds and mammals	Beneficial	n/a	B1 Low
A9	Disposal of surplus subsoil	Smothering of native flora and fauna	D2 Medium	1-12, 9-01, 9-02, 9-04	D1 Low
A10	Disposal of trench-water and hydrotest water	Smothering of invertebrates, fish mortality	B3 Low	3-17, 3-21, 3-24, 3-30, 10-02, 10-03, 10-04, 10-06, 10-08, 10-09, 10-10, 10-11, 10-15, 10-16, 10-19, 10-21	B1 Low
A11	Impeded flow of river or stream	Loss of aquatic and water-margin habitats, restriction of fish movement and reduced reproductive success, impaired movement and reduced habitat suitability for other aquatic organisms	B3 Low	10-18, 11-01, 11-02, 11-03, 11-04, D5-079	B2 Low
A12	Use of water from river or channel, e.g. for hydrotesting, dust suppression and make-up water during drilling of non-open-cut crossings	Loss of aquatic or water-margin habitats, reduced suitability of watercourse for aquatic fauna, removal of aquatic organisms from the river	D4 High	10-09, 15-03, D5-078, D5-079	D1 Low
A17	Loss of natural habitat/vegetation (terrestrial, riparian and aquatic)	Reduced biodiversity	C3 Medium	2-02, 3-14, 3-19, 9-02, 10-14, 11-05, 17-05, 17-07, 17-08, 17-10, 17-11, 17-05, 17-14, 17-16, 17-18, 19-10, D5-045, 30-23, 32-03, OP51, OP52, OP61	C2 Low
		Modified habitat structure	C3 Medium		C2 Low
		Loss of breeding and foraging areas for fauna	B2 Low		B1 Low

Issue		Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
		Habitat severance and impacts on movement of fauna	C2 Low		C1 Low
A18	Introduction of competitive species or diseases	Poor re-colonisation by local flora following reinstatement	B2 Low	18-01, 18-02, 18-05, 18-07	B1 Low
		Modified habitats due to non-native species establishment	B3 Low		B1 Low
A19	Disturbance or harm to wildlife	Reduced breeding potential and population	B-D 1 to 2 Low to Medium	2-02, 3-14, 9-02, 19-04, 19-05, 19-06, 19-07, 19-08, 19-10, 28-11, D5-045, 19-11a–e, 19-12 a–b, 19-13a–b, 19-14	B-D 1 to 2 Low to Medium
		Changed behaviour	B-D 1 to 2 Low to Medium		B1 Low
		Increased predation	B-D 1 to 2 Low to Medium		B1 Low
		Injury or death	B-D 2 or 3 Low to Medium		B-D 1 or 2 Low to Medium
A20	Impeded movement of wild animals, domestic herds and people due to open trench, pipe string or spoil storage mounds	Disruption of animal movements affecting their ability to forage	B2 Low	20-01, 32-08, 32-09	B1 Low
A21	Open excavations (including open trench)	Injury to fauna from falling into excavations or death where they cannot escape or where they are at increased risk of predation	B2 Low	21-01, 21-02, 21-04	B1 Low
A25	Noise emissions from vehicle movements; construction activities; construction camp and pipe storage areas; pigging station and BVRs during operation	Disturbance affecting breeding and/or behaviour of animals	B2 Low	25-01 to 25-05, 25-07 to 25-09, 25-11	B1 Low

Issue		Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
A39	Storage of chemicals, oil, fuel, accidental spills and mud break-out during drilling of non-open-cut crossings	Stress or mortality of flora and fauna due to drilling mud break out or spills into watercourses	D4 High	6-03, 6-04, 6-05, 6-09, 6-10, 6-11, 6-12, 6-20, 6-21, 10-01, 10-22, 39-06, 7-10, 7-11, 7-12, 7-14, 7-16	D1 or 2 Low to Medium

* assessed using Tables 3-11 and 3-12

Table 10-13: Ecological Assessment at Sensitive Locations and/or Receptors

Location	Sensitive Receptor	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
KP0–KP35	*Iris acutiloba* (RDB plant species)	Loss of a small percentage of the local population of *Iris acutiloba*	C3 Medium	X7-32, 19-10	C1 Low
KP0–KP3.2	*Salsoletum nodulosae* desert	Habitat loss, fragmentation and degradation	D2 Medium	X7-25 a-b, 19-10	D1 Low
KP5–KP14	Ephemeretum desert	Habitat loss, fragmentation and degradation	D2 Medium	X7-25 a-b, 19-10	D1 Low
KP5–KP24	Desert habitats where vegetation on adjacent BTC route has been slow to recover	Potential for cumulative habitat loss, fragmentation and degradation in combination with slow recovery on BTC ROW	D2 Medium	X7-25 a–b, 19-10	D1 Low
KP32	Reed-bed habitat	Habitat loss, fragmentation and degradation	C4 Medium	X6-01, X7-28a-b, 2-01, 3-30, 14-03, 17-10, 17-11, 19-10, 19-11a-e, 19-13a-b	C1 Low
KP85–KP96	Desert habitats where vegetation on adjacent BTC route has been slow to recover	Potential for cumulative habitat loss, fragmentation and degradation in combination with slow recovery on BTC ROW	D2 Medium	X7-25 a–b, 19-10	D1 Low

Location	Sensitive Receptor	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
KP115 (Geokchay)	Riparian habitats and their use as a wildlife corridor	Habitat loss, fragmentation affecting use of the river as a movement corridor and degradation during clearance of temporary working area at non-open-cut river crossings	B2 Low	X7-28a-b, 17-08, 17-14, 19-11a-e, D5.045, 17-05, 17-07, 17-10, 17-11	B1 Low
KP116–120 (Garaberk village) and KP121–125 (Alpout village)	Trees if they contain bat roosts	Disturbance or mortality of bats; loss of roosting habitat if trees removed	D2 Medium	X7-34; 17-08	D1 Low
KP137 (Turianchay)	Riparian habitats and their use as a wildlife corridor	Habitat loss, fragmentation affecting use of the river as a movement corridor and degradation during clearance of temporary working area at non-open-cut river crossings	C2 Low	X7-28a-b, 17-14, 19-11a-e, D5.045, 17-05, 17-07, 17-10, 17-11	C1 Low
KP138–KP158.1	Desert habitats where vegetation on adjacent BTC route has been slow to recover	Potential for cumulative habitat loss, fragmentation and degradation	D2 Medium	X7-25 a–b, 19-10	D1 Low
KP167 (Kura East)	Riparian habitats and their use as a wildlife corridor	Habitat loss, fragmentation affecting use of the river as a movement corridor and degradation during clearance of temporary working area at non-open-cut river crossings	C2 Low	X7-28a-b, 17-08, 17-14, 19-11a-e, D5.045, 17-05, 17-07, 17-10, 17-11	C1 Low
KP205-KP250	Goitered gazelle (*Gazella subgutturosa*)	Potential barrier to movement or migration of this species to and from the Korchay State Nature Reserve	D2 Medium	20-01, 21-01, 21-02, 21-04, 32-08, 32-09, X7-37	C1 Low
KP221 (Kurekchay)	River-bank nesting fauna	Potential impact on fish spawning and bank-nesting fauna of hard reinforcement	D3 Medium	X7-21 a–b	D1 Low

Location	Sensitive Receptor	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
	Fish spawning habitat and fish migration	Potential impact on fish spawning habitat and migration for fish spawning during pipe installation	D3 Medium	X7-30	D1 or 2 Low or Medium
KP237 (Korchay)	Reed-bed habitat	Habitat loss, fragmentation and degradation	D2 Medium	X7-29	D1 Low
KP240 (Ganjachay)	River-bank nesting fauna	Potential impact on fish spawning and bank-nesting fauna of hard reinforcement	D3 Medium	X7-21 a–b	D1 Low
	Fish spawning habitat and fish migration	Potential impact on fish spawning habitat and migration for fish spawning during pipe installation	D3 Medium	X7-30	D1 or 2 Low or Medium
KP254–256 (Samukh area)	RDB plant species, if present	Habitat loss, fragmentation and degradation leading to potential loss of RDB species, if present	D3 Medium	X7-28 a–b	D1 Low
KP261 (Goshgarachay)	River-bank nesting fauna	Potential impact on fish spawning and bank-nesting fauna of hard reinforcement	D3 Medium	X7-21 a–b	D1 Low
	Fish spawning habitat and fish migration	Potential impact on fish spawning habitat and migration for fish spawning during pipe installation	D3 Medium	X7-30	D1 or 2 Low or Medium
KP277 (Shamkirchay)	Fish spawning habitat and fish migration	Potential impact on fish spawning habitat and migration for fish spawning during pipe installation	D3 Medium	X7-30	D1 or 2 Low or Medium
KP287–KP289	Potential presence of roosting bats in house, livestock pens and a belt of trees	Disturbance or mortality of bats, loss of roosting habitat if trees removed	D2 Medium	X7-34, 17-08	D1 Low

Location	Sensitive Receptor	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
KP303 (Zeyamchay)	River-bank nesting fauna	Potential impact on fish spawning and bank-nesting fauna of hard reinforcement	D3 Medium	X7-21 a–b	D1 Low
	Fish spawning habitat and fish migration	Potential impact on fish spawning habitat and migration for fish spawning during pipe installation	D3 Medium	X7-30	D1 or 2 Low or Medium
KP321–KP322.9	ROW passes through *Artemisetum botriochloasum* semi-desert and *Caraganetum-Paliurosum spina-christi* arid scrub dependent on a thin topsoil layer in area of narrow erodible ridges before and after the crossing of the Asrikchay and Tovuzchay, including *Artemisetum* steppe with arid forest in stream bed between KP322.6 to KP322.9	Habitat loss, fragmentation and degradation	D3 Medium	X7-28 a–b, X7-33 a-b, 19-10	D1 Low
KP323 (Asrikchay)	River-bank nesting fauna	Potential impact on fish spawning and bank-nesting fauna of hard reinforcement	D3 Medium	X7-21 a–b	D1 Low
	Fish spawning habitat and fish migration	Potential impact on fish spawning habitat and migration for fish spawning during pipe installation	D3 Medium	X7-30	D1 or 2 Low or Medium
KP324 (Tovuzchay)	River-bank nesting fauna	Potential impact on fish spawning and bank-nesting fauna of hard reinforcement	D3 Medium	X7-21 a–b	D1 Low
	Fish spawning habitat and fish migration	Potential impact on fish spawning habitat and migration for fish spawning during pipe installation	D3 Medium	X7-30	D1 or 2 Low or Medium

Location	Sensitive Receptor	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
KP335.4–KP336.4, KP342–KP346, KP346.1–KP351, KP359–KP370 and KP383–KP390	*Artemisetum lerchiana purum* semi-desert	Habitat loss, fragmentation and degradation	D2 Medium	X7-28 a–b, X7-33 a–b, 19-10	D1 Low
KP345 (Hasansu)	Riverbank nesting fauna	Potential impact on fish spawning and bank-nesting fauna of hard reinforcement	D3 Medium	X7-21 a–b	D1 Low
	Fish spawning habitat and fish migration	Potential impact on fish spawning habitat and migration for fish spawning during pipe installation	D3 Medium	X7-30	D1 or 2 Low or Medium
KP345 to KP347	*Iris camillae* (RDB plant species)	Loss of individual plants	C3 Medium	X7-23, 19-10	C1 Low
KP358 (Kura West)	Riparian habitats and their use as a wildlife corridor	Habitat loss in working areas needed for microtunnnel construction; fragmentation affecting use of the river as a movement corridor	C2 Low	X7-28a-b, 17-14, 19-11a-e, D5.045, 17-05, 17-07, 17-10, 17-11	C1 Low
KP369 (Kurudere)	River-bank nesting fauna	Potential impact on fish spawning and bank-nesting fauna of hard reinforcement	D3 Medium	X7-21 a–b	D1 Low
	Fish spawning habitat and fish migration	Potential impact on fish spawning habitat and migration for fish spawning during pipe installation	D3 Medium	X7-30	D1 or 2 Low or Medium
Access to Kurdemir Pipe Storage Area Option 1 and 2 (Mususlu)	Phragmiteta-Typhetum wetland area. Irrigation canal	Possible loss of a band of wetland due to road upgrade for transport of pipe Option A**.	C3 Medium	17.07; 17.10; 17.11; 17.14; 17.18, X7-36	C2 Low

Location	Sensitive Receptor	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
Access to Kurdemir Pipe Storage Area Option 1 and 2 (Mususlu)	Phragmiteta-Typhetum wetland area. Irrigation canal	Possible loss of a band of wetland due to road upgrade for transport of pipe Option B**. Loss of vegetation at irrigation canal due to culverting	B3 Low		C1 Low
Goranboy Camp Option 3, including new temporary access to camp	Trees and shrubs on the site boundaries	Accidental damage or removal	B3 Low	D5-045	B1 Low
Saloghlu Pipe Storage Area	Garayazi State Nature Reserve	Effects of noise, dust and light on protected species within the protected area	C2 Low	X7.35, 25-07, 25-08	C1 Low
Samukh Camp Option 3	Trees and shrubs on the site boundaries	Accidental damage or removal	B3 Low	D5-045	B1 Low
Ujar Camp Option 5	Band of shrub vegetation on the eastern boundary	Accidental damage or removal	B3 Low	D5-045	B1 Low

* assessed using Tables 3-11 and 3-12
** see Section 10.7.3.2 for a description of the two options for road upgrade

10.7.4 Mitigation of Ecological Impacts

The impact avoidance and mitigation measures summarised below will be applied to activities that could affect habitats and species. This section lists the mitigation commitments that relate directly to ecology. Many other commitments contribute to minimising impacts on ecology and these are listed in Table 10-12 above, but they are not discussed in detail here as they are covered fully in their respective sections. In particular, mitigation measures for soil compaction, soil erosion, soil structure and disposal of surplus subsoil are discussed in Section 10.3 and solid and liquid waste disposal in Section 10.6. Mitigation measures for disposal of trench and hydrotest water are discussed in Section 10.5. Monitoring and management of compensation tree planting is described in Section 10.4.

10.7.4.1 At the design and pre-construction stages

The Kura East river crossing (KP167) will be constructed by horizontal directional drilling (HDD) and the Kura West river crossing (KP358) by micro-tunnelling under the river. The intent here is to avoid potentially significant impacts on fish and other aquatic and riparian fauna.

A variety of surveys and ecological mitigation works will be carried out pre-construction as detailed below:

A pre-construction survey between April and May inclusive will be undertaken at pipe storage and camp locations, and any nearby watercourses that may be impacted, of the

plants and animals present on site to identify any need for site-specific mitigation measures (17-18).

The actual location and extent of cultivated and un-cultivated land on the ROW and working areas will be determined during a pre-construction survey. The survey will be completed in the year prior to construction (19-12a). The vegetation in areas of uncultivated land where topsoil stripping will occur between April and July (inclusive) will be cut close to ground level in the period between August and March prior to stripping, to discourage birds and other animals from nesting here (19-12b).

A preconstruction survey between November and February inclusive will be undertaken at KP205-250 to identify any need for site-specific mitigation measures to reduce potential impact to gazelle during winter migration (X7-37).

A survey will be completed for bank nesting fauna on river crossings programmed to be constructed in April-July (inclusive). The survey will be undertaken between April and September in the year prior to construction. It will search in particular for IUCN and RDB species, which may include otter (*Lutra lutra*), European marbled polecat (*Vormela peregusna*), ladder snake (*Elaphe hohenackeri*), crested porcupine (*Hystrix indica*) and hole-nesting birds (19-13a). If any bank-nesting IUCN or RDB birds or other animals are found in pre-construction surveys of these watercourses, measures will be taken to aim to prevent inhabitation of the area during construction (19-13b). Further details are given in the ecological management plan in the ESMMP, see Appendix D.

Surveys for and translocation of RDB plants species will be carried out as described in Section 10.7.4.2 below.

A pre-construction survey will be carried out and if bats are found to be roosting in any structures or trees that will be removed, a mitigation strategy will be designed to try to ensure that bats are protected (X7-34).

The Company will prepare site specific Ecological Management Plans for priority areas. Contractor will incorporate the requirements of the plans into the site-specific method statements (19-10).

At the Saloghlu Pipe Storage Area, a buffer zone between the site and the protected area will be determined by Company (X7-35).

At Kurdemir Pipe Storage Area Options 1 and 2 (Mususlu), any widening of the access track associated with these sites will be planned to take place during the late summer or autumn with the aim of avoiding peak periods for wintering birds and breeding amphibians/reptiles/birds. If this is not possible then works will only be done following a site-specific survey and assessment and approval by the Company (X7-36).

10.7.4.2 Proposed pipeline construction and commissioning, including pigging station, block valves, construction camps, pipe storage areas and rail spur and offloading areas

Habitat loss, fragmentation and degradation

Construction and reinstatement of the pipeline has the potential to cause loss of semi-natural habitats on the ROW and associated disruption of movement or migration of fauna, but this will be mitigated by implementing a detailed reinstatement programme with the aim of re-establishing natural vegetation on the ROW. Soil handling is of critical importance to successful ecological reinstatement. Commitments on protecting topsoil structure and function and minimising soil erosion and compaction are listed in Table 10-12 and discussed in Section 10.3.4.2. Reinstatement will be undertaken as early as practicable and in accordance with the reinstatement specification (4-09). The reinstatement plan in the ESMMP provides detailed prescriptions for topsoil stripping, handling, storage and re-instatement. In sections of the route that have been highlighted as having increased sensitivity, additional precautions will be taken to try to preserve the topsoil and the seed

bank are preserved to the greatest possible extent, as discussed in Section 10.3.4.2. The ecological management plan in the ESMMP includes information on removing invasive and alien plant species that have colonised topsoil stacks if needed.

A record will be made of the condition of access roads, construction camps, lay-down areas and rail offloading areas and any special features on the ROW before construction to inform the reinstatement works (17-14).

Existing third-party services and sensitive receptors that need to be avoided during construction (e.g. cultural heritage sites, or specific trees that are to be retained) will be marked (D5-045). This will include the trees adjacent to the Goranboy Camp Option 3 Samukh Camp Option 3 and Ujar Camp Option 5.

The ROW of the SCPX pipeline and any additional temporary workspaces will be surveyed and set out (i.e. marked out and, where necessary, fenced off). The contractor will be required to keep within the designated footprint (30-23).

Parking of Project-related vehicles will be restricted to designated areas (32-03).

No species that are considered likely to out-compete the indigenous plant species will be used in seed mixes (18-01). No invasive species will be used in seed mixes for erosion control or biorestoration (18-02). Where work areas need to be reseeded to promote biorestoration this will be done with locally collected seed. Any deviations to be approved by the Company (18-07).

Some sections of the route have been identified as having increased sensitivity to the potential impacts of pipeline construction (Table 10-13). The reasons for slow recovery in these sections is probably largely due to the harsh environmental conditions (high winds and temperature variations, fine-textured soils prone to compaction) in the first case, and naturally slow re-colonisation by locally native species in the second case. Due consideration will be given to the preservation of the topsoil structure and seed bank in identified habitats (KP0–KP3.2, KP5-KP24, KP85-KP96 and KP138-KP158.1) (X7-25a). If long-term monitoring of vegetation in these habitats shows slow recovery, remedial action will be considered (X7-25b). Further details are given in the ecological management plan in the ESMMP (see Appendix D).

Between KP321–KP322.9, KP335.4–KP336.4, KP342–KP346, KP346.1–KP351, KP359–KP370 and KP383–KP390, seed will be collected from similar habitats where and to the extent feasible in the local area and re-sown onto the ROW during reinstatement (X7-33a). If long-term monitoring shows slow recovery of the ROW in these areas, remedial action will be considered (X7-33b).

Field boundaries will be reinstated to pre-existing condition on completion of construction (3-19). Where trees need to be felled for pipeline construction, compensation planting will be based on the number of trees to be removed. A re-planting ratio will be developed which will be species and region specific (17-08). The necessary permit from the MENR will be applied for to cut down any Forest fund trees on the ROW or temporary working areas. The location of the Forest fund areas will be confirmed by MENR consultation (8-05).

Temporary works areas will be reinstated to near original condition (as compared to pre-construction survey reports or adjacent areas) (17-05).

The Contractor shall inspect and wash all plant and equipment prior to shipping to the country of use with the aim of ensuring as far as practical, it is free from soil and plant material (18-05).

Impacts on rare plant species

There are known populations of the Red Data Book plant species *Iris acutiloba* in the Gobustan area (although not on the SCPX ROW), and there is habitat suitable for this species on the SCPX ROW between KP0 and KP35. 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 between KP0 - KP35 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 (X7-32).

A site specific ecological management plan to address *Iris camillae* on the ROW will be developed. This will be implemented when the plants are visible i.e. during or after the flowering season between April and May (X7-23).

Several other sections of the route have species-rich vegetation and it is possible that there are RDB plant species growing here, which could include *Iris camillae*. Preconstruction surveys will be carried out by the Company at the most appropriate time of year (generally April-May depending on seasonality) at the defined locations (KP254–KP256, KP321-KP322.9, KP335.4-KP336.4, KP342-KP346, KP346.1-KP351, KP359-KP370 and KP383-KP390) to seek to establish the presence of any RDB plant species (X7-28a). A site specific ecological management plan to address RDB plants identified on the ROW or working areas during pre-construction surveys will be developed. This will be implemented when the plants are visible, i.e. during or after the flowering season between April and July, depending on the species (X7-28b).

Impacts on river habitats and fauna

The key sensitivities at river crossings are spawning fish, associated movement of fish, and river-bank-nesting fauna and reptiles and amphibians associated with rivers and streams – both impacts on these species when breeding or hibernating or when moving/migrating, for example to and from hibernation and breeding areas (see Section 10.7.3.1).

The project will aim to avoid or minimise the impact on these receptors at river crossings during the construction phase through a number of means, as described below.

Fish

There are nine rivers that will be open-cut and which potentially support IUCN Red List or Azerbaijan Red Data Book fish species during the spawning season (Kurekchay, Ganjachay, Goshgarachay, Shamkirchay, Zeyamchay, Asrikchay, Tovuzchay, Hasansu and Kurudere). The Project shall avoid direct impacts (i.e. habitat disturbance in the channel) or increases in suspended sediments in the water in these rivers during the spawning season.

Works at the Kurekchay, Ganjachay, Goshgarachay, Shamkirchay, Zeyamchay, Asrikchay, Tovuzchay, Hasansu and Kurudere river crossings will be planned to occur outside the fish spawning season. If work must be undertaken within the fish spawning season (of any IUCN/red data book species present, nominally April to July, the exact timing of which will be determined following a pre-construction survey) it will only be done following a site assessment and approval by the Company (X7-30). Watercourse crossing methods will be developed with the aim of minimising the mobilisation of sediments (11-05). Daily visual monitoring of turbidity will be undertaken at river crossings while works are being undertaken at that river. This will be supplemented as necessary by probe monitoring (10-16).

Photograph 10-10: The Zeyamchay, a Wide River with Gravel Beds that Could be Used by Spawning Fish including some RDB and IUCN Red List Species

Only essential construction vehicles (as approved by the Company) will be allowed to enter rivers or streams and only with prior examination of the vehicles for fuel/lubricant leaks. Generally, the Construction traffic will cross watercourses via a flume/culvert (piped bridge), which will be sized so as not to restrict the flow in the watercourse and allow fish and other aquatic organisms to pass through (10-18). Washing of Project plant and vehicles in watercourses will not be undertaken (10-22).

Before extracting water the Project will consider the presence of any IUCN/Red data book fish species particularly during fish spawning season (which normally occurs within the period April to July) and the mitigations such as 10mm fish screens will be determined by a site assessment and approval by the Company (D5-079).

The river crossing contractor will prepare a plan to respond to an outbreak of drilling mud if this occurs during a non-open-cut crossing, including clean up and remediation for outbreak on land and liaison with downstream users in the event of outbreak in the water (7-16).

Riparian habitats and fauna
Construction of river crossings has the potential to alter habitat structure and function. In addition there are some IUCN Red List or Azerbaijan Red Data Book (RDB) animal species that are closely associated with riverbanks.

In addition to the pre-construction mitigation measures to be undertaken for bank-nesting fauna (see *At the design stage*, above), the following will be undertaken.

At watercourses, bank and bed material will be stored separately, away from the active channels and will not be placed where flow or drainage will be obstructed (3-23). They will be replaced following pipeline installation to aid reinstatement of in-channel functional habitat such as gravel beds for fish spawning and riparian habitats used by bank-nesting and riparian fauna.

Watercourse banks affected by the Project crossings will be restored to near original condition, which will be assessed individually for each watercourse or other area and

defined in the Contractor's Reinstatement Implementation Plan. Any deviations (e.g. because hard reinforcement is required for erosion control) shall be subject to Company approval (10-14). Effective reinstatement will restore the riparian habitat as a movement corridor.

If artificial bank or bed reinforcement is required at the Kurekchay, Ganjachay, Goshgarachay, Zeyamchay, Asrikchay, Tovuzchay, Hasansu or Kurudere, an assessment of the potential impacts (including habitat connectivity) and identification of any necessary mitigation measures will be undertaken by the Contractor (X7-21a). Any bed reinforcement at the Kurekchay, Ganjachay, Goshgarachay, Zeyamchay, Asrikchay, Tovuzchay, Hasansu or Kurudere will be planned to occur outside the fish-spawning season. If work must be undertaken within the fish-spawning season (of any IUCN/red data book species present nominally April to July, the exact timing of which will be determined following a pre-construction survey) it will only be done following a site assessment and approval by the Company (X7-21b).

At the Korchay, the existing reed bed will be reinstated and the watercourse will be reinstated rather than flumed permanently. A permanent access route across the watercourse will not be installed (X7-29).

Photograph 10-11: The Korchay Reservoir Downstream of the Proposed SCPX Crossing and the Existing BTC Crossing

Note: The reed bed shown in this photograph is also present at the SCPX crossing point. It is an important habitat for wildlife where re-instatement will aim to minimise potential impacts on habitats and fauna.

Spawn of amphibian species
All open-cut or watercourse crossings or vehicle crossings constructed between April to July (inclusive) will be checked by the Company for amphibian spawn of suspected red data book species, and if any is found it will be moved to a suitable location upstream (19-14).

Potential disturbance and harm to wildlife
Terrestrial fauna are likely to be using the route for different reasons depending on the time of year. During spring and summer, species such as ground-nesting birds may be breeding on the ROW. During winter, some species may be hibernating in burrows or under stones or

vegetation, and during the rest of the year many species may be searching for food or feeding on vegetation on the ROW. Most of these species are wide-ranging and may breed, forage, move, migrate or hibernate over a wide territorial area. Their breeding and hibernating locations may change from year-to-year, so it is rarely possible to identify precise locations that should be avoided for their protection in advance of commencement of works. Advance pre-construction survey and vegetation cutting and exclusion works will be done to deter nesting, (see *At the design stage*, above). In addition, the Company will check the ROW and any other working area prior to vegetation cutting and topsoil stripping to identify any IUCN Red List or Azerbaijan Red Data Book species (19.11a), such as *Testudo graeca* (spur-thighed tortoise) – IUCN VU, RDB, *Bufo bufo* – RDB or *Francolinus francolinus* (black francolin) – RDB. The action taken if any are found will depend on the time of year and the species that are found:

- If any IUCN Red List or Azerbaijan Red Data Book species are found on the ROW or other working area outside of the breeding season (July to September inclusive), they will be moved a safe distance away from the ROW and released into suitable habitat in accordance with the methods in the Site specific ecological management plans (19-11b)
- If any IUCN Red List or Azerbaijan Red Data Book species are found hibernating on the ROW or other working area during the hibernating season (October to March inclusive) they will be moved to a new hibernating site a safe distance from the ROW in accordance with the methods in the Site specific ecological management plans (19-11c)
- If any IUCN Red List or Azerbaijan Red Data Book species are found nesting on the ROW or other working area they will be left undisturbed until a Company assessment has been carried out taking into account whether the species can be moved or whether it should remain in place until breeding has been completed and the young have moved away from the nest (19-11d)
- The Company will produce a detailed Method Statement for the safe methods of moving any IUCN Red List or Azerbaijan Red Data Book species or other animals that cannot move easily away from the ROW, and suitable exclusion zones where required (19-11e). Exclusion zones will be confirmed by the supervising ecologist on a case-by-case basis depending, for example, on the sensitivity and importance of the species and/or the location of a nest in relation to the ROW.

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). The pipe will not normally be strung on the ROW more than 15km in advance of pipeline welding (32-09). 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). The trench will be checked regularly (particularly in sensitive locations) (21-04). The Company will prepare Site Specific Ecological Management Plans for priority areas. Contractor will incorporate the requirements of the plans into the site-specific method statements (19-04). 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). A preconstruction survey between November and February inclusive will be undertaken at KP205-250 to identify any need for site-specific mitigation measures to reduce potential impact to gazelle during winter migration (X-7-37).

The above measures should ensure that there are no significant impacts on the potential movement of goitered gazelles around the Korchay State Nature Reserve.

No hunting, fishing or unauthorised gathering of products (including plants and cultural heritage artefacts) by the workforce will be permitted within the Project footprint (19-05). Wildlife sensitivity to disturbance will be included in workforce training (19-06).

Environmental and social issues will be included in workforce and visitor induction training (28-11).

The above measures to reduce disturbance to nesting and hibernating animals and the general mitigation measures described in Section 10.9.4 will also help reduce any impacts from noise.

10.7.4.3 In the operations phase

A monitoring plan will be developed to determine the success of re-vegetation and bio-restoration activities, including the appropriateness of species composition (3-14). This is likely to involve extending and revising the existing BTC/SCP biorestoration monitoring plan as needed to cover monitoring of the SCPX Project.

The Project will seek to achieve an increasing trend in vegetation re-growth and species diversity (specifically species composition) in reinstated areas with reference to nearby areas undisturbed by Project activities, as recorded by the percent similarity and commonality indices (17-07). The re-establishment of vegetation will be monitored following reinstatement until it has reached Project near- and long-term re-vegetation targets (17-10). Corrective measures will be implemented if establishment of vegetation is not successful or if, following survey and data analysis, the species composition is considered by a Project ecologist to be unsuitable for the area (17-11). These measures are aimed at restoring not only the habitats crossed but also their functionality, e.g. as wildlife corridors.

Local people will be actively discouraged from using the ROW as an access road (through use of signage, public education, leaflets etc.) (3-09). The Company will encourage EPPD security patrols to use existing access tracks wherever possible, and not to drive along the ROW (17-16). When patrolling the pipeline, the Project will use horse patrols wherever practicable, minimising vehicular access except where necessary for maintenance purposes (OP61).

Lighting at BVRs and pigging stations will be designed and operated to minimise light-spill and potential impacts on wildlife and wildlife movement (such as bats and invertebrates). Lighting at the BVRs and pigging station will not be permanently lit at night.

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 and Table 10-13. In summary, the likely residual impacts of predicted low significance are:

- Small-scale soil compaction on the ROW and at construction camp, pipe storage areas and rail spur and offloading areas from vehicle movements affecting less than 1% of the total amount of any habitat type within the Project zone of influence Barely discernable 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 discernable 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 disruption of goitered gazelle movements during construction of the pipeline around Korchay State Nature Sanctuary (KP205–KP250)
- 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, outside of the fish spawning season, unlikely to exceed background levels
- Temporary displacement or disturbance of non-breeding riparian fauna during open-cut river crossings
- Re-location of RDB plant species (*Iris camillae* and possibly *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
- Effects of noise, dust and light on protected species within the protected area adjacent to the Saloghlu Pipe Storage Area
- Impacts on habitat, birds, amphibians and reptiles due to the widening of an access track through a wetland close to Kurdemir Pipe Storage Areas Options 1 and 2 (Mususlu)
- Impacts on degraded wetland at KP32.

It is not predicted that the pipeline will have anything more than temporary minor residual impacts of low significance on protected areas. No protected area is crossed by the pipeline route and none of the temporary facilities are located in protected areas. Where the pipeline is close to a protected area there may be non significant effects on small numbers of individuals associated with the protected area either due to effects on the protected area from noise, light or dust or effects on species crossing the pipeline route during movements into or out of the protected area. At Saloghlu Pipe Storage Area, a buffer zone will be established to help reduce any potential effects. There are not predicted to be any impacts on the overall health/integrity of the protected area or its associated species. The impacts of

any temporary disruption of goitered gazelle movements during construction of the pipeline around Korchay State Nature Reserve (KP205–KP250 is predicted to be of low significance.

There are some activities that could result in medium significance impacts, depending on how they are managed. These are discussed here:

- At open-cut river crossings, the scale of impact will depend partly on the timing and also on the crossing method selected. Sediment releases during isolated crossings are generally low except during installation and removal of dams or flumes and this is predicted to result in an impact of low significance. Non-isolated open-cut crossings during flow conditions can have much higher levels of sediment release, and this could result in an impact of medium significance on fish or spawning habitat if the main open-cut river crossings were carried out in the spawning season. However, the mitigation measures proposed will aim to avoid this by programming works outside the spawning season and undertaking spawning assessments prior to any decision to approve open-cut crossings in the spawning season
- At non-open-cut river crossings, it is possible that mud break-out will occur. Generally this is likely to only result in a small-scale impact but this is highly dependant on the timing, location, quantity and make-up of the mud breakout. The make-up of the drilling mud in particular has potential implications for the scale of predicted impact. If a large break-out were to occur on a river that is important for spawning fish (e.g. the Kura) during the spawning season, the predicted impact could be Medium
- 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. However, there is a low risk that impacts could be medium if, despite the mitigation measures proposed, breeding success was affected - this would depend on the number of individuals affected.

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 SCPX Project and associated mitigation measures to be adopted.

10.8.1 Aspects of the SCPX Project that have the potential to Emit Atmospheric Pollutants and Greenhouse Gases

The main air quality impacts from the proposed SCPX Project 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, the BVRs and pigging station are expected to be minimal.

Engines and processes that combust fuels, depending upon the nature of the fuel, may have the potential to emit atmospheric pollutants including nitrogen oxides[8] (NO_x), sulphur dioxide (SO_2), carbon monoxide (CO) and particulate matter (PM)[9], greenhouse gas carbon dioxide (CO_2) and volatile organic compounds (VOCs)[10] that include both atmospheric pollutants and greenhouse gases.

[8] NO_x includes nitrogen dioxide (NO_2) and nitric oxide (NO)
[9] Particulate matter is used in this context to describe inhalable particles generally PM_{10} and below
[10] The term VOC is loosely applied to a wide range of organic compounds but in this context it is used as defined in the UNECE VOC Protocol (1991) as “all organic compounds of an anthropogenic nature, other than methane, that are capable of producing photochemical oxidants by reactions with nitrogen oxides in the presence of sunlight”

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

- Operation of diesel powered vehicles on roads to and from the construction camps, pipe storage areas, rail spur and offloading areas, ROW, pigging station and BVRs and along the ROW
- Operation of diesel powered construction plant during construction at the ROW, construction camp, pipe storage areas and rail spur and offloading areas, the pigging station and BVRs (NO_x, CO, SO_2, VOC, PM_{10}). There is a possibility that the camps could use electricity from the grid for start-up of the generators or to supply some or all of their electrical requirements but this would only be done following a review of the capacity of the local grid with the aim of avoiding impacts on communities or other users
- Operation of diesel power generators at construction camps during the construction phase
- Operation of small temporary incinerators at construction camps (this has not yet been confirmed, but may be a possibility for inert, non-hazardous and hazardous wastes that cannot be reused or recycled).

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, and back-up diesel generators at the BVRs in the event of a power failure. However, the main source of power to the pigging station will be provided by gas powered Thermal Electric Generators (TEGs) and the BVRs will usually take electricity from the existing grid network
- 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:

- Operation of the gas-powered thermo-electric generators (TEGs) used to generate electricity at the pigging station for its own use
- Fugitive emissions from valves and connections at the pigging station and BVRs (VOC, mainly methane)
- Venting during routine maintenance/testing at the pigging station and BVRs 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, construction camp, pipe storage and rail spur and offloading areas, pigging station and BVRs
- Vehicle movements on roads to and from the construction camps, pipe storage and rail spur and offloading areas, ROW, pigging station and BVRs and along the ROW
- Pipeline trenching
- Extraction and placing of aggregate for road construction and construction of the camp, pipe storage areas and rail spur and offloading areas, pigging station and BVRs
- 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 and the discharge of nitrogen, as described in Section 5.7.2 and 5.7.4.

10.8.2 Key Sensitivities

Human health is sensitive to exposure to levels of atmospheric pollutants that exceed the ambient air quality standards (see Appendix D, ESMMP, Appendix B) for the SCPX Project Ambient Air Quality Standards).

The human respiratory function is sensitive to exposure to dust levels above the SCPX Project Ambient Air Quality Standards:

- PM_{10}: 20μg/m^3 annual average, 50μg/m^3 24-hour average (not to be exceeded more than 3 days a year, 99th percentile)
- $PM_{2.5}$: 10μg/m^3 annual average, 25μg/m^3 24-hour average.

Residents of houses and occupants of schools or hospitals and vegetation and crops that are close to the sites where construction activity raises dust are likely to be particularly sensitive to dust emissions and have the potential to be adversely affected. Fine dust, i.e. >10μm in diameter can also cause disturbance by depositing in or around sensitive receptors.

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

- Under dry conditions, the soil types present along the pipeline route may be prone to generate dust when disturbed and wind speed can be relatively high along certain sections of the pipeline route, particularly in the west
- 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 proposed SCPX route passes in close proximity to dwellings at the following four locations: SCPX KP62.2, KP104-KP108, KP116-KP120, KP121-KP125 and KP287-KP289, where there will potentially be sensitivity to increased levels of dust generated by the movement of Project vehicles along the ROW
- Ujar Camp Option 5 and most of the rail spur, offloading and pipe storage areas, and some un-tarmaced access roads to them, are close to houses, see Table 10-15
- A shepherd lives for 6 months of the year on the boundary of the Saloghlu Pipe Storage site
- BVR A06 is located within 50m of livestock pens that are lived in for part of the year.

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 and BVRs. These locations are however remote from dwellings (see Section 10.9) and therefore the sensitivity of these sites is considered likely to be low, with the exception of BVR A6 where the livestock pens are lived in for part of the year.

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, block valves, construction camps, pipe storage areas and rail spur and offloading areas

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 (NO_x and SO_2) 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.

Combustion gases will also be generated at the camps, pipe storage areas and rail spur and offloading areas where fixed generators will be used to supply electricity (unless a connection to the grid is available and can be used without affecting other users). Although fixed, these have not been modelled as they are temporary in nature. In addition, if used, any waste incinerators used at the camps would also burn some fuel and discharge flue gasses to air.

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 5.11.7.2.

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, and back-up diesel generators at the BVRs in the event of a power failure
- 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
Minor releases of fugitive emissions will occur from the refuelling of vehicles at filling stations within the proposed construction camps and from on-site fuel trucks. They will also occur from re-filling the fuel tanks within the camps. However, the vehicles and machinery that will be used are typically diesel powered and would be expected to have lower fugitive losses in comparison to alternative fuels such as petrol. The use of diesel fuel will therefore minimise the evaporative losses of hydrocarbons. If petrol powered vehicles and plant are occasionally used the additional fugitive losses from refuelling will be minimal.

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

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 SCPX Project. Carbon dioxide will be emitted from all engines and combustion equipment used by the Project during construction and operation. Fugitive emissions resulting from refuelling will also result in the localised release of VOCs. Estimated emission quantities during construction are given in Section 5.11.7.2.

In addition, during the operations phase, there will be GHG emissions from the pigging station associated with operation of the TEGs and planned venting operations. Fugitive releases will also occur from the flanges and connections at the proposed BVRs and 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 5.11.7.2.

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

Dust/particulate matter generation
Fugitive dust emissions arising from construction activities are likely to be variable in nature and will depend upon the type and extent of the activity, soil type and moisture content, road surface conditions and weather conditions. Periods of dry weather combined with higher than average wind speeds have the potential to generate more dust.

Natural background dust levels are already high in many of the areas which will be disturbed by the proposed SCPX Project, however construction activities and vehicle movements can cause dust agitation in addition to that already caused by the wind. Dust will be generated as a result of vehicle movements (see Photograph 10-12) and typical construction activities (e.g. stripping, levelling and compacting). Dust emissions will be temporary, restricted to permitted working hours and will vary in frequency (i.e. they will not be continuous).

Photograph 10-12: Dust Generated from Passing Vehicle during Dry Weather Conditions in Semi-desert Area near Sangachal Terminal

Fugitive dust arising from construction activities is generally of a particle size greater than the PM_{10} fraction (that which can potentially impact upon human health). Once airborne, dust will travel down wind before settling. The distance travelled depends primarily on wind speed and particle size. For example, smaller particles and strong winds result in greater dilution effects but mean that the dust is deposited over a larger area. However, dust issues typically occur within a few hundred metres of their point of generation.

The potential impacts are disturbance of local residents and deposition on vegetation, organisms and surfaces. Potential secondary impacts include impacts on human health. Prolonged exposure to high levels of airborne dust can affect the health of people who suffer from respiratory disorders, see Section 10.12.3. Whether dust deposition becomes a problem is a subjective issue and depends on a variety of factors including the sensitivity of nearby locations, the repetitive nature of any deposit occurring and the nature of the particulate itself. Due to this subjectivity there are no statutory limits on dust deposition and the focus is on the prevention of disturbance and minimising airborne dust emissions where practicable.

Secondary impacts from dust also include social issues such as impacts on livelihoods, including crops and honey production in bees. Although bee keeping is common in Azerbaijan, it is limited in the area that will be affected by the Project. Sensitive crops to dust include fruit and vegetables. Livelihood impacts and community impacts are discussed in Section 10.13.

Appropriate dust control measures are highly effective for the dust generating activities identified above, and adverse effects can be greatly reduced or eliminated.

During operations, dust generation will be limited to generation by vehicles patrolling the pipeline ROW or using unsurfaced access tracks to gain access to the ROW.

10.8.3.2 Impact summary and assessment of significance

Table 10-14 provides an assessment of the likely significance of potential generic air quality impacts before and after implementation of the proposed mitigation measures that are discussed in the rest of this section. Impacts on the locations identified as particularly sensitive are assessed in Table 10-15.

Table 10-14: Potential Generic Impacts on Air Quality

Issue		Potential Impacts	Potential Impact Significance	Mitigation Measures	Potential Residual Impact Significance
A22	Use of energy	Reduced air quality	B1 Low	22-01, 22-02	B1 Low
A23	Release of gases and vapours to atmosphere from vehicle exhausts, camp, BVR and pigging station operation, concrete batching, welding, cleaning and testing of pipeline; and fugitive emissions from fuel storage and refuelling	Reduced air quality from construction emissions	B2 Low	7-01, 23-02, 23-03, 7-13, D12-03	B2 Low
		Emission of greenhouse gases during operation	B1 Low		B1 Low

Issue		Potential Impacts	Potential Impact Significance	Mitigation Measures	Potential Residual Impact Significance
A24	Dust generation, particularly from vehicle movements, storage of excavated materials and operation of concrete batching plant	Reduced air quality	B4 Medium	2-02, 4-09, 23-05, 23-06, 24-01, 24-02, 24-05, 24-06, 24-07, 24,12, 33-01, 33-18	C2 Low

* assessed using Tables 3-13 and 3-14

Table 10-15: Air Quality Impact Assessment at Sensitive Locations and/or Receptors

Location	Issue	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
BVR A06 (KP21)	Dust generation, particularly from vehicle movements	Disturbance and reduced air quality for resident(s) and at the livestock pens	D4 High	D8-04, X8-04, 23-05, 23-06, 24-01	B1 Low
KP62.2	Dust generation, particularly from vehicle movements	Disturbance and reduced air quality for resident(s)	D4 High	X8-04, 23-05, 23-06, 24-01	D3 Medium
Chiyny village (KP104-KP108)	Dust generation, particularly from vehicle movements, storage of excavated materials and operation of concrete batching plant close to houses	Disturbance to residents; reduced air quality	D-E4 High	X8-04, 23-05, 23-06, 24-01	D-E3 Medium
Garaberk village (KP116–KP120)					
Alpout village (KP121–KP125)					
Dallyar Dashbulak village (KP287–KP289)					
Agstafa, Goranboy, Kurdemir, Samukh, Ujar camps	Waste treatment by incineration, if installed	Reduced air quality in local area	C2 Low	X8-05, 7-13	C1 Low

Location	Issue	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
Dallar Pipe Storage and Dallar Rail Spur and Offloading	Dust generation from vehicle movements; topsoil and vegetation clearance	Disturbance to residents as sites are close to houses and/or on the access road to the site	E3 Medium	X8-04, 23-05, 23-06, 24-01, 24-02	E2 Medium
Dallar Pipe Storage Area Option 1B (Bayramli)			E2 Medium		E2 Medium
Gazanchi Pipe Storage Area Option B			E2 Medium		E2 Medium
Gazanchi Rail Spur and Offloading			E2 Medium		E2 Medium
Kurdemir Rail Spur and Pipe Offloading Area			E4 High		E3 Medium
Kurdemir Pipe Storage Area Option 1 (Mususlu)			E2 Medium		E2 Medium
Mugan Rail Spur, Offloading Area, Pipe Storage Area and access road			E3 Medium		E2 Medium
Poylu Pipe Storage Area			E3 Medium		E2 Medium
Saloghlu Rail Spur and Offloading			E3 Medium		E2 Medium
Saloghlu Pipe Storage			E4 High	X8-04, D8-05, 23-05, 23-06, 24-01, 24-02	E3 Medium
Samukh Camp Option 3			E2 Medium	X8-04, 23-05, 23-06, 24-01, 24-02	E2 Medium
Ujar Camp Option 5			E2 Medium		E2 Medium
Yevlakh Rail Spur, Offloading and Pipe Storage Area and unpaved road			E4 High	X8-04, X9-05, 23-05, 23-06, 24-01, 24-02	E3 Medium

* assessed using Tables 3-13 and 3-14

10.8.4 Mitigation of Emissions

The main mitigation measures that will be adopted to seek to reduce the impacts associated with air emissions are described below.

10.8.4.1 At the design stage

A leak detection system is provided on the pipeline. Following detection of a leak, the block valves on either side of the leak will be remotely closed so that the volume of release will be limited by the distance between the two block valves (D12-03).

The distances from the nearest dwellings to temporary working areas will be determined and commitment X8-04 implemented if any dwellings are close enough for there to be medium or high predicted impacts from dust during construction (24-12).

The livestock pens and temporary accommodation will be relocated a minimum distance of 200m from the boundary of BVR A6 (D8-04). This is with the aim of ensuring there are no significant effects on the temporary dwelling associated with the pens as a result of dust during construction.

There will be a 50m buffer zone between the herder's temporary dwelling and the pipe storage boundary fence at Saloghlu Pipe Storage Area (D8-05).

At the Yevlakh Pipe Storage Area, Rail Spur and Offloading Areas a new access road will be created away from existing houses and occupied residences (X9-05).

10.8.4.2 Proposed pipeline construction and commissioning, including pigging station, block valves, construction camps, pipe storage areas rail spur and offloading areas

Use of energy

The workforce training will include advice on minimising energy consumption (22-02). Example measures will include advice on minimising engine idling time and using equipment of a suitable size for the task. Energy efficiency in the camps will be monitored against key performance indicators (KPIs) and measures will be identified and implemented with the aim of continual improvement (22-01).

Release of exhaust gases and fugitive emissions

Equipment and vehicles will be regularly maintained in accordance with the manufacturer's recommendations to maximise fuel efficiency and help minimise emissions (23-02). Preferentially, the project will use fuel that has low sulphur content of 0.1%, where practical and available within Azerbaijan (23-03).

Controlled or uncontrolled burning of waste will not be allowed (with the exception of Company -approved incinerators) (7-01).

If incineration is chosen as an option for waste treatment at the camps, an air quality and emissions monitoring programme will be developed and implemented in accordance with applicable permit requirements (X8-05). Relevant training will be provided to those with responsibilities for monitoring of effluent discharges and emissions such as effluent sample taking and chain of custody (7-13).

Emissions of natural gas during commissioning should be minimal as discussed in Section 5.7, so no specific mitigation measures are proposed.

Dust

Measures that will be adopted to help prevent dust problems from occurring include:

- Vehicle movements will be restricted to defined access routes and demarcated working areas (unless in the event of an emergency) (2-02)
- Reinstatement will be undertaken as early as practicable and in accordance with the Reinstatement Specification (4-09)
- Contractor will be required to have an adequate supply of bowsers and to regularly damp down the ROW, access roads and village roads used by construction traffic during dry conditions (24-01)
- A strict Project speed limit of 30km/hr will be enforced for project vehicles using unmade tracks and the ROW (24-02)
- Vehicles carrying fine materials will be sheeted to help prevent dust blow and spillages (23-06)
- Dust generation and concentrations in the air will be visually monitored during construction where activities are near communities. If dust is visible, additional mitigation measures, such as the imposition of tighter speed limits, will be implemented with the aim of avoiding causing disturbance on residents or land users (23-05)
- Treated waste water will be used for damping down road surfaces to mitigate dust generation (24-07).

Bees are particularly sensitive to dust. Community Liaison Officers will identify any beekeepers whose hives are within 300m of the pipeline and facility construction, camp and pipe storage areas or access routes before the start of the honey production season. These beekeepers will be asked to move their hives (both mobile hives and stationary hives) a suitable distance (at least 300 metres) from the route for the season (24-05). The Company will develop and implement a policy for the compensation of beekeepers adversely affected by Project impacts (24-06).

Particular attention will be paid to the implementation of dust suppression measures at the sensitive locations, as detailed in Table 10-3. At locations where the proposed SCPX route passes in close proximity to dwellings (KP62.2, BVR A06, KP104–KP108, KP116–KP120, KP121–KP125, KP287–KP289) and at camps and pipe storage yards close to dwellings, the Project will undertake monitoring for dust generation and damping down as necessary (X8-04).

Mitigation measures for borrow-pits and aggregate sites will be in accordance with the general mitigation measures described above. The impacts of dust emissions will be considered as part of the process of audit and assessment of these sites described in Section 10.2.4.

The Contractor will be required to develop and implement a Grievance Procedure to provide opportunity for local residents to raise concerns (33-01). Community Liaison Officers may assist in raising community awareness about emissions-related issues and ensuring emissions-related complaints are followed up and responses provided (33-18).

10.8.4.3 In the operations phase

No further specific mitigation measures are proposed given the very low emissions anticipated during operations.

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 (KP62.2, KP104-KP108. KP116-KP120, KP121-KP125 and KP287-KP289), and at camps, pipe storage yards and rail spur and offloading areas close to dwellings, 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.

Relocation of the herder at BVR A6 will result in a low residual impact from dust.

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 SCPX Project and associated mitigation measures to be adopted. Noise and vibration are both assessed qualitatively based on sensitivities and distances from sources of noise and vibration generation, as there are no significant permanent facilities that will generate noise or vibration as part of the proposed SCPX Project in Azerbaijan.

10.9.1 Aspects of the SCPX Project 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
- Construction camp operations (including generators)
- Use of construction plant on the ROW and at the construction sites for the pigging station and BVRs
- Topsoil stripping and grading
- Stringing pipe
- Cold pipe bending
- Pipe welding
- Excavation (e.g. pipeline trench on ROW, equipment foundations at the pigging station and BVR sites)
- Pipe lowering and backfilling of the trench
- Piling activities during construction – this is likely to be limited to temporary piling at non-open-cut crossings but may also be needed at the pigging station and BVRs
- 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 TEGs at the pigging station (and at BVRs when backup generators used in the case of grid supply interruption)
- 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 close to camps, pipe storage areas and rail spur and offloading areas and communities through which access roads are routed, which may have schools, hospitals or dwellings close to the road. 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:

- There are communities located along the proposed pipeline route that are potentially sensitive to increased noise
- Proposed access roads to the ROW are likely to use what are currently quiet rural roads, several of which pass potentially sensitive receptors (e.g. houses or settlements); 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
- Ujar Camp Option 5 is approximately 150m from the nearest house; none of the other preferred camp sites are close to houses with the potential exception of Samukh Camp Option 3 if a nearby area is developed for housing. The potential cumulative impacts of this are discussed in Chapter 11
- Most of the pipe storage areas and rail spur and offloading areas are within close proximity (100m or less) of houses, see Table 10-20. A herder lives for 6 months of the year on the boundary of the Saloghlu Pipe Storage site
- The proposed SCPX route passes through rural areas where ambient noise levels, particularly at night, can be expected to be low or very low (sometimes less than 20db(A) at night). This may lead to complaint when construction activities need to be carried out overnight (e.g. pipeline testing or horizontal directional drilling, HDD)
- The proposed SCPX route passes in close proximity to dwellings at the following four locations: SCPX KP62.2, KP104-KP108. KP116-KP120, KP121-KP125 and KP287-KP289, where there will potentially be sensitivity to increased noise and vibration
- BVR A06 is located within 50m of livestock pens, which are lived in for part of the year
- The IDP settlement at Shusha (KP60) contains dwellings made from reeds, which may be particularly sensitive to vibration impacts.

10.9.3 Noise and Vibration Impacts

10.9.3.1 Noise during pipeline construction including pigging station, block valves, construction camps, pipe storage areas rail spur and offloading areas

General construction noise

The proposed SCPX 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, pigging station and BVR 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 10-16 shows typical noise levels that may be expected at various distances from the ROW.

Table 10-16: Typical Noise Levels Associated with Various Construction Activities

L_{AEQ} [11](DB) Calculated from BS 5228 at Varying Distances from ROW					
Construction Activities	**50m**	**150m**	**250m**	**350m**	**450m**
Initial access and fencing	76	67	62	59	57
Site preparation and ROW	74	65	60	57	55
Topsoil stripping and site grading	82	72	68	65	63
Pipe haul and stringing	83	73	69	66	64
Cold pipe bending	73	63	59	56	54
Mainline welding	79	70	65	62	60
Trench excavation	79	70	65	63	60
Pipe lower, lay and tie-in	75	66	61	58	56
Backfilling	72	62	58	55	52

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

[11] 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.

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 in close proximity to dwellings at the following locations: SCPX 62.2, KP104–108, KP116–120, KP121–125 and KP287–289. These are all within approximately 20 to 85m of the pipeline centreline, and therefore the 65dB(A) daytime noise limit is likely to be exceeded during most construction activities. Activities should not extend for more than one month at locations that would result in exceedances at these receptors.

In general, construction work along the pipeline ROW will be temporary and discontinuous and will not expose local residents to disturbance from noise for extended periods. At the pigging station and BVRs, construction noise will be more continuous. The distances of the nearest dwellings to the facilities sites are listed below:

- The nearest dwelling to the proposed pigging station location is over 1km away
- The nearest dwelling to the proposed block valve at KP21 is approximately 50m
- The nearest dwelling to the proposed block valve at KP95 is over 1km away
- The nearest dwelling to the proposed block valve at KP172 is approximately 400m
- The nearest dwelling to the proposed block valve at KP243 is approximately 500m
- The nearest dwelling to the proposed block valve at KP334 is over 1km away.

With the exception of the BVR site at KP21, the above distances indicate that all other facilities are at least 400m from the nearest dwelling, and therefore daytime noise limits are unlikely to be exceeded, with the possible exception of the BVR site at KP172. At BVR A6 the temporary residence of the herder is approximately 50m from the BVR.

At night, generators may be needed to run security lighting at the pigging station and BVR construction sites 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 and BVRs.

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, construction camps, pipe storage areas and rail spur and offloading areas, however, 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.

Construction camp and pipe offloading and storage areas and associated traffic
Noise from construction camps, pipe storage areas and rail spur and offloading areas is likely to be mainly produced from diesel generators, unless the sites can connect to the electrical grid, and increased traffic in the vicinity of the camps, particularly in the early

morning and evening when vehicles are travelling to the ROW, pigging station and BVRs from the camps and vice versa.

The following preferred camps, pipe storage areas and rail spur and offloading areas have dwellings within 200m, which may therefore be impacted by noise:

- The nearest house to Mugan Rail Spur, Offloading and Pipe Storage Area is approximately 80m from the site
- Kurdemir Rail Spur and Offloading Area is approximately 50m from the nearest dwellings
- Kurdemir Pipe Storage Area Option 1 (Mususlu) is approximately 150m from the nearest houses
- Ujar Camp Option 5 is approximately 150m away from the closest settlement
- Yevlakh Pipe Storage Area and Yevlakh Rail Spur are approximately 50m away from the closest houses
- Gazanchi Pipe Storage Area Option B is approximately 50m away from the closest settlement
- Gazanchi Rail Spur and Offloading is approximately 100m from the nearest settlement
- Dallar Pipe Storage and Dallar Rail Spur and Offloading have houses within 50m and 100m respectively, however, they are on the opposite side of a road and will already be experiencing elevated nose levels from road traffic and a nearby quarry
- Dallar Pipe Storage Area Option 1B (Bayramli) is between 50 – 100m away from the nearest house
- Poylu Rail Spur and Offloading is approximately 100m away from the nearest settlement
- Poylu Pipe Storage Area is approximately 100m from the nearest house
- Saloghlu Rail Spur and Offloading is approximately 50m away from the nearest settlement
- At Saloghlu Pipe Storage Area the shepherd's hut, which is occupied for part of the year, is on the site boundary.

The access roads to the following temporary sites pass through communities or close to houses:

- Mugan Pipe Storage Area, Rail Spur and Offloading Area
- At the entrance to the Yevlakh Pipe Storage Area and Rail Spur and Offloading Area
- Dallar Pipe Storage Area
- Samukh Camp Option 3 but the route has yet to fully defined
- Poylu Rail Spur and Offloading Area

Predicted noise at the nearest receptors from typical activities onsite for the above storage and offloading areas are shown in Table 10-17:

Table 10-17: Estimated Noise Levels Associated with Temporary Facilities at Different Distances

L_{AEQ} [12](dB) Calculated from BS 5228 at Varying Distances from Storage and Offloading Area				
Construction Activities	**20m**	**50m**	**100**	**150**
Wheeled Loader	67	59	53	50
Tacked mobile crane	63	55	49	46
Generator	72	64	58	54
Total	73	65	59	56

The results show that exceedances of the daytime BS 5228 threshold are predicted at the nearest receptor to the Mugan Pipe Storage Area.

10.9.3.2 Noise during pipeline commissioning and testing, including pigging station and block valves

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 10-18.

Table 10-18: Combined Noise Levels from One Diesel Pump and One Generator

Distance from Source (m)	**50m**	**150m**	**250m**	**350m**	**450m**
Noise Level $L_{Aeq,15min}$ dB	70	60	56	53	50

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 SCPX facilities (pigging station and BVRs) will operate equipment that generates noise; however this noise will be of low level and the distance to the nearest dwellings from the sites is over 400m. 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.

[12] 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.

10.9.3.4 Vibration during proposed pipeline construction including pigging station, block valves, construction camps, pipe storage areas and rail spur and offloading areas

Humans generally become aware of vibration at levels of around 1.5mms^{-1}, although under some circumstances this can be as low as 0.5mms^{-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 2mms^{-1} at 5m and compactors less than 0.3mms^{-1} at 30m. Pile driving typically generates less than 3mms^{-1} at 50m. Unless buildings are very close to construction operations, they are unlikely to be damaged by vibrations from the construction plant.

The proposed SCPX route passes in close proximity to dwellings at four locations: KP104-KP108, KP116-KP120, KP121-KP125 and KP287-KP289. Construction activities may cause damage to buildings or walls due to vibration in these locations.

Vibration caused by construction traffic is rarely high enough to be the direct cause of cracks in walls and ceilings, separation of masonry blocks, and cracks in foundations. Such cracks may be the result of soil settlement due to compaction rather than vibration (Hunaidi, O., 2000). The threshold vibration level needed to damage a building is not clear, though the US Office of Surface Mining considers that vibration of less than 38mms^{-1} will not damage structures. In some cases, when a building is subjected to vibration for many years, repeated vibration causes fatigue damage. In other cases vibration can contribute to deterioration of buildings that are already damaged by soil settlement, moisture, temperature cycles or poor maintenance. If construction traffic adds to these problems, it could trigger damage and complaints from house owners. The access roads to the Mugan Pipe Storage Area, Rail Spur and Offloading Area, Samukh Camp Option 3, Yevlakh Pipe Storage Area and Rail Spur and Poylu Rail Spur and Offloading Area pass close to buildings, so there is low potential risk of impacts in these areas.

The condition of the road surface near a building has a very significant effect on the levels of vibration. AES Engineering Solutions (website, 2012) notes that vehicles on a smooth road surface create much lower levels of vibration (typically <0.2mms^{-1} at 20m) than do heavy vehicles travelling fast on roads with a rough surface of badly filled potholes or service trenches (typically <2mms^{-1}).

The activities to be carried out during operation (such as operation of the TEG and back-up diesel generators) will not generate any appreciable vibration, so this phase is not considered further.

10.9.3.5 Impact summary and assessment of significance

Table 10-19 provides an assessment of the likely significance of potential generic noise and vibration impacts before and after implementation of the proposed mitigation measures which are discussed in the rest of this section. Impacts on the locations identified as particularly sensitive are assessed in Table 10-20.

Table 10-19: Impact Assessment Summary for Noise and Vibration

Issue		Potential Impacts	Potential Impact Significance	Mitigation Measures	Potential Residual Impact Significance
A25	Noise emissions from vehicle movements; construction activities; construction camp and pipe storage areas; pigging station and BVRs during operation	Disturbance affecting breeding and/or behaviour of animals	B2 Low	23-02, 25-01, 25-02, 25-03, 25-04, 25-05, 25-07, 25-08, 25-09, 25-11, 25-20, 33-01, 33-18, 37-08, 37-10, 37-20, OP28, OP50, OP148	B1 Low
		Disturbance, lack of sleep for shift workers, and loss of concentration for school children	C2 Low		C2 Low
A26	Vibration from vehicle movements and other construction operations	Damage to houses and other structures	B1 Low	24-02, 25-13, 25-14, 25-15, 25-16, 37-08, 37-20	B1 Low

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

Table 10-20: Noise Impact Assessment at Sensitive Locations and/or Receptors

Location	Issue	Potential Impacts	Potential Impact Significance*	Receptor-Specific Mitigation**	Residual Impact Significance*
BVR A6 (KP21)	Noise from construction activities	Disturbance, lack of sleep for temporary resident(s) at the livestock pens	C2 Low	D8-04,~~X8-06,~~ X9-03, 25-04, 25-05, 25-09, X9-04	C2 Low
KP62.2	Noise from construction activities as ROW approximately 20m from house	Noise disturbance, lack of sleep	C2 Low	X9-04, 25-04, 25-05, 25-09	C2 Low
	Vibration from construction activities as ROW approximately 20m from house	Potential risk of damage to house	D2 Medium	25-13, 25-14	D1 Low
Shusha IDP village (KP59)	Vibration from construction activities	Potential risk of damage to buildings as these made from reeds	E3 Medium	25-13, 25-14	E1 Low
Chiyny village (KP104–108)	Noise from construction activities as ROW approximately 80m from nearest houses	Disturbance, lack of sleep for villagers and shift workers	C2 Low	X9-04, 25-04, 25-05, 25-09	C2 Low

Location	Issue	Potential Impacts	Potential Impact Significance*	Receptor-Specific Mitigation**	Residual Impact Significance*
Garaberk Village (KP116–120)	Noise from construction activities as ROW approximately, 20, 40, 50 and 60m from nearest houses	Disturbance, lack of sleep for villagers and shift workers	C2 Low	X9-04, 25-04, 25-05, 25-09	C2 Low
	Vibration from construction activities as ROW approximately, 20, 40, 50 and 60m from nearest houses	Potential risk of damage to buildings	D2 Medium	25-13, 25-14	D1 Low
Alpout Village (KP121–125)	Noise from construction activities as ROW approximately 60 and 85m from nearest houses	Disturbance, lack of sleep for villagers and shift workers	C2 Low	X9-04, 25-04, 25-05, 25-09	C2 Low
	Vibration from construction activities as ROW approximately 60 and 85m from nearest houses	Potential risk of damage to buildings	D2 Medium	25-13, 25-14	D1 Low
BVR KP172	Noise from construction activities as nearest houses are less than 400m from site	Disturbance, lack of sleep for villagers and shift workers	C2 Low	X9-03, 25-04, 25-05, 25-09, X9-04	C2 Low
Dallyar Dashbulak Village (KP287-289)	Noise from construction activities as ROW approximately 20m from nearest house	Disturbance, lack of sleep for villagers and shift workers	C2 Low	X9-04, 25-04, 25-05, 25-09	C2 Low
	Vibration from construction activities	Potential risk of damage to buildings	D2 Medium	25-13, 25-14	D1 Low
Dallar Pipe Storage and Dallar Rail Spur and Offloading	Pipe offloading, storage and vehicle movement on site and on access road through the local community	Noise disturbance as nearest houses 50m from site, but on other side of road	C2 Low	X9-03, 25-03, 25-04, 25-05, 25-08, 25-09, X9-04, 37-10	C2 Low

Location	Issue	Potential Impacts	Potential Impact Significance*	Receptor-Specific Mitigation**	Residual Impact Significance*
Dallar Pipe Storage Area Option 1B (Bayramli)	Pipe offloading, storage and vehicle movement	Noise disturbance as nearest house 50 - 100m from site	C2 Low	X9-03, 25-03, 25-04, 25-05, 25-08, 25-09, X9-04, 37-10	C2 Low
Gazanchi Pipe Storage Area Option B	Pipe offloading, storage and vehicle movement	Noise disturbance as nearest house 50m from site	C2 Low	X9-03, 25-03, 25-04, 25-05, 25-08, 25-09, X9-04, 37-10	C2 Low
Gazanchi Rail Spur and Offloading	Pipe offloading, storage and vehicle movement	Noise disturbance as nearest house 100m from site	C2 Low	X9-03, 25-03, 25-04, 25-05, 25-08, 25-09, X9-04, 37-10	C2 Low
Kurdemir Rail Spur and Offloading	Pipe offloading, storage and vehicle movement	Noise disturbance as nearest houses 50m from site, but houses other side of railway line	C2 Low	X9-03, 25-03, 25-04, 25-05, 25-08, 25-09, X9-04, 37-10	C2 Low
Kurdemir Pipe Storage Area Option 1 (Mususlu)	Pipe offloading, storage and vehicle movement	Noise disturbance as nearest houses 150m from site	C2 Low	X9-03, 25-03, 25-04, 25-05, 25-08, 25-09, X9-04, 37-10	C2 Low
Mugan Pipe Storage Area and Rail Spur and Offloading Area	Pipe offloading, storage and vehicle movement on site and on access road to the site through adjacent community	Noise disturbance as nearest houses 80m from site, but houses are other side of railway line	C2 Low	X9-03, 25-03, 25-04, 25-05, 25-08, 25-09, X9-04, 37-10	C2 Low
	Heavy vehicle movements on access road through adjacent community	Potential damage to houses caused by vibration	D4 High	25.13, 25.14. 25.15, 25.16	D1 Low
Poylu Rail Spur and Offloading	Pipe offloading, storage and vehicle movement	Noise disturbance as nearest house 100m from site	C2 Low	X9-03, 25-03, 25-04, 25-05, 25-08, 25-09, X9-04, 37-10	C2 Low
	Heavy vehicle movements on access roads to site	Potential damage to houses caused by vibration	D2 Medium	25.13, 25.14. 25.15, 25.16	D1 Low
Poylu Pipe Storage Area	Pipe offloading, storage and vehicle movement	Noise disturbance as nearest house 100m from site	C2 Low	X9-03, 25-03, 25-04, 25-05, 25-08, 25-09, X9-04, 37-10	C2 Low

Location	Issue	Potential Impacts	Potential Impact Significance*	Receptor-Specific Mitigation**	Residual Impact Significance*
Saloghlu Camp	Increased levels of heavy vehicle movements along access road to site	Noise disturbance	C2 Low	25-03, 25-04, 25-05, 25-08, 37-10	C2 Low
Saloghlu Rail Spur and Offloading	Pipe offloading, storage and vehicle movement	Noise disturbance as nearest house 50m from site	C2 Low	X9-03, 25-03, 25-04, 25-05, 25-08, 25-09, X9-04, 37-10	C2 Low
Saloghlu Pipe Storage Area	Pipe offloading, storage and vehicle movement	Noise disturbance as shepherd's hut less than 50m from site	C4 Medium	D8-05, X9-03, 25-03, 25-04, 25-05, 25-08, 25-09, X9-04, 37-10	C2 Low
Samukh Camp Option 3	Increased levels of heavy vehicle movements along access road to site and construction camp related activities	Noise disturbance. Houses on route to the site and house 150m from site	C2 Low	X9-03, 25-03, 25-04, 25-05, 25-08, 25-09, X9-04, 37-10	C2 Low
	Heavy vehicle movements on access roads to site	Potential damage to houses caused by vibration	D2 Medium	25.13, 25.14. 25.15, 25.16	D1 Low
Ujar Camp Option 5	Increased vehicle movements and construction camp related activities	Noise disturbance as nearest house 150m from site	C2 Low	X9-03, 25-03, 25-04, 25-05, 25-08, 25-09, X9-04, 37-10	C2 Low
Yevlakh Pipe Storage Area, Rail Spur and Offloading Areas	Pipe offloading, storage and vehicle movement on site and on access road at entrance to the site where it passes houses	Noise disturbance as nearest house 50m from site	C2 Low	X9-03, 25-03, 25-04, 25-05, 25-08, 25-09, X9-04, 37-10, X9-05	C2 Low
	Vibration from heavy vehicles passing close to houses at the entrance to the site	Potential risk of damage to buildings	D4 High	X9-05; 25-13, 25-14, 25-15, 25-16	D1 Low

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

10.9.4 Mitigation of Noise and Vibration Impacts

The impact avoidance and mitigation measures summarised below will be applied to activities that could generate noise disturbance.

10.9.4.1 Proposed pipeline construction and commissioning, including pigging station, block valves, construction camps, pipe storage areas and rail spur and offloading areas

Noise

Some noise impact on the surrounding environment and any nearby residents is inevitable during any construction operation. In order to avoid significant disturbance from noise emissions, the following mitigation measures will be adopted:

- Equipment and vehicles will be regularly maintained in accordance with the manufacturer's recommendations to maximise fuel efficiency and help minimise emissions (23-02)
- During construction work will generally be undertaken in daylight hours (excluding specified operations). Where people live in close proximity to the works, or there is a high potential for disturbance, a location-specific risk assessment will be undertaken for activities undertaken between 7pm and 7am (25-01)
- Driver training will include advice on behaviours to reduce the potential for disturbance, including use of horn, loud radios with windows open, switching engines off when not in use, strictly observing speed limits and not accelerating or braking aggressively (25-02)
- Project induction training will include instructions about minimising noise disturbance (25-03)
- Local residents will be forewarned of planned activities that are considered by the project to be noisy (e.g. pile driving and release of test pressure) (25-04)
- Noise will be monitored periodically against the Project Environmental Standards (25-05)
- Camp rules will be developed and implemented and will include restrictions on noisy activities (e.g. inappropriate use of personal radios) to help avoid causing disturbance (25-07)
- The project will avoid vehicle reversing where practical, and will preferentially use white noise[13] type reversing alarms (25-08)
- Surface of frequently used access roads will be subject to regular inspections and repair, with the aim of ensuring they are maintained in a good condition particularly where fragile buildings are close to roads (subject to site-specific survey) (37-08)
- The Contractor will be required to develop and implement a Grievance Procedure to provide opportunity for local residents to raise concerns (33-01)
- Community Liaison Officers may assist in raising community awareness about emissions-related issues and ensuring emissions-related complaints are followed up and responses provided (33-18)
- Night-time driving will be by exception only, as approved by Company to minimise driving risk and disturbance to communities (37-10).

During construction of the pipeline and facilities and operation of the construction camp and pipe storage areas, where the works are less than 400m from residential buildings for longer than one month, periodic noise monitoring readings of 10 minutes duration (jn accordance with the Project procedure) will be measured at the building facade at the start of the potentially noisy activities. If the noise exceeds project standards, measures will be implemented to aim to reduce noise levels (e.g. hoardings) (25-09). Other appropriate measures could be mitigation such as screening, location or orientation of equipment (such

[13] A random signal (or process) with a flat power spectral density

as generators), substitution or maintenance and time constraints. This will be applied particularly to the noise sensitive areas listed in Table 10-20.

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 (KP62.2, KP104-KP108, KP116-KP120, KP121-KP125, KP287-KP289); and at the BVRs at KP21 and KP172 (X9-04).

Site layout will be designed, where practical and feasible, to locate noisy plant in areas further away from houses at the BVR at KP172 and camps and pipe storage areas where a risk assessment shows that there may be significant noise impacts on sensitive receptors (X9-03).

The distances from the nearest dwellings to temporary working areas will be determined and commitments 25.09, X9.03 and X9.04 implemented where dwellings are close enough for there to be medium or high predicted impacts from noise during construction (25-20).

The livestock pens and temporary accommodation will be relocated a minimum distance of 200m from the boundary of BVR A6 (D8-04) to help ensure there is no significant noise impacts on the temporary dwelling that is associated with the livestock pens.

At Saloghlu Pipe Storage Area there will be a 50m buffer zone between the herder's temporary dwelling and the pipe storage boundary fence at Saloghlu Pipe Storage Area (D8-05).

At the Yevlakh Pipe Storage Area, Rail Spur and Offloading Areas a new access road will be created away from existing houses and occupied residences (X9-05).

Mitigation measures for borrow-pits and aggregate sites will be in accordance with the general mitigation measures described above. The impacts of dust emissions will be considered as part of the process of audit and assessment of these sites described in Section 10.2.4.

Vibration
Particularly sensitive locations to vibration have been listed in Table 10-20. Prior to selection all access routes will be subject to a multidisciplinary assessment (37-20).

Vibration sensitive locations will be determined by the Contractor and listed in their Pollution Prevention Implementation Plan, together with details for monitoring vibration before and during movement of heavy equipment. Further actions will depend on the outcome of vibration monitoring (25-13).

A survey record will be undertaken to record the external condition of buildings in close proximity to the ROW or access roads prior to construction; this will provide baseline evidence in the event of claims for damage (25-14). The validity of any damage claims will be assessed; repairs will be undertaken or appropriate compensation paid if damage is associated with construction vehicle movements (25-15).

To minimise vibration, the Contractor will be instructed to implement the following:

- Correct tyre pressures will be monitored and maintained (25-16)
- A strict Project speed limit of 30km/hr will be enforced for project vehicles using unmade tracks and the ROW (24-02).

Surface of frequently used access roads will be subject to regular inspections and repair, with the aim of ensuring they are maintained in a good condition particularly where fragile buildings are close to roads (subject to site-specific survey) (37-08).

10.9.4.2 In the operations phase

During early operations, 10-minute readings will be taken at the nearest noise sensitive receptors to the pigging station to confirm that the site will meet the appropriate Project Environmental Standards (OP148).

A preventative maintenance programme will be implemented that is designed to ensure that all plant and equipment operate in accordance to with Project Standards (OP50).

The Project will monitor the occurrence of noise complaints in respect of the BVRs and pigging station as part of the operational grievance procedure to determine whether there is a specific link with noisy activity and determine whether further action is required (OP28). Community Liaison Officers may assist in raising community awareness about emissions-related issues and following up and responding to emissions-related complaints (33-18).

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 at construction camps, pipe storage areas and rail spur and offloading areas and associated access roads is also expected to have a low residual impact significance.

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 effects of operational noise on communities located in the vicinity of the SCPX facilities is not expected to be significant due to the distance between the facilities and 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 SCPX Project and associated mitigation measures to be adopted.

10.10.1 Aspects of the SCPX Project 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, ROW access roads, construction camps, equipment lay-down and pipe yard areas, and the facility sites
- Construction and grading of access roads
- Trench excavation in the ROW
- Excavation of foundations at the facility sites
- 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

Azerbaijan's long and complex history and pre-history of human occupation is reflected in the number of its archaeological sites. A major concern is that construction activities could damage sites with significant cultural heritage structures or artefacts before they have been studied and understood, and before their importance has been assessed. Disturbance may move or damage fragile objects or makes the context of the remains difficult to interpret. Deposits may be deeply buried and not identified until their presence is revealed by construction work. Many features of human origin have been identified during the baseline surveys.

Part of the pipeline route crosses an area where little information is known and the BTC and SCP pipeline monitoring revealed little additional information. Other parts of the Project are located in regions where there is a very high density of known information and a high potential for the discovery of additional features, as was demonstrated in the BTC and SCP projects. There is high potential for new discoveries to be found during earthmoving operations as part of the Project.

10.10.3 Impacts on Cultural Heritage

In many cases, detailed information on archaeological features only becomes available during the construction phase of a Project owing to the intrusive nature of the process. Therefore, the accurate assignment of consequence/severity prior to the construction phase is often not possible and relies on a preliminary assessment based on known information.

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. These features may be known before project construction or may be discoveries of previously unsuspected sites. Although evidence is physically lost, 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. Any archaeological programme associated with large-scale development can have the secondary beneficial impact of increasing knowledge, both of previously explored areas and of locations where archaeological surveys have not been conducted previously. The observations of a project can create a link between archaeological sites and the landscape and environment it crosses.

Table 10-21 and Table 10-22 determine the consequence or severity of likely impacts by taking into account the protected status, level of preservation of remains and the potential for destruction of archaeological deposits. The cultural heritage assessment is based upon IFC Performance Standard 8 and uses the criteria from the UK Highways Agency 'Design Manual for Roads and Bridges', Part 2 HA 208/07 Cultural Heritage. This last document is taken as the model from which the majority of assessments in the UK and Western Europe are performed. The full list of sites is found in Chapter 8 and covers all known features within a 2km-wide corridor of the proposed Project route.

It is not possible to define in each case whether there will be an impact on each location where archaeology is defined in this study. The majority of sites were identified as a result of discoveries during construction of BTC and SCP. There were no surface indications showing that features were present in these areas. Given that SCPX will be constructed 25m away from the earlier projects, it cannot be assumed that the same archaeological features will be found to extend into the proposed project. BTC and SCP were constructed with a separation of 18m and in approximately 50% of cases, the archaeological evidence was not repeated. There are a few sites on SCPX where we can be sure that deposits will be found in the new project. Sites CH054 Faxrali, CH065 Seyidlar and CH086 Dashbulaq are locations with spreads of surface material or known densities of buried deposits where the expectation is very high that features will be found. The majority of the other sites have a

lower expectation that deposits will be found, although, overall, a similar number of sites and density of features will be found along the length of the Project. The most commonly applied score given in Table 10-22 is one of 'unclear' or 'uncertain'. These can be taken to mean that work is needed in these areas to identify and mitigate the full impact of the project.

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 10-21: Potential Generic Impacts on Cultural Heritage

Issue	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
A27	Loss/disturbance of known archaeology	C4 Medium	27-01, 27-02, 27-04, 27-10,	C2 Low
A27	Loss/disturbance of previously unknown archaeology during construction	C4 Medium	19-05, 25-13, 25-16, 27-03, 27-05, 27-06, 27-07, 27-08, 27-09, 27-11, 27-13, 37-20	C2 Low
A27	Disturbance of archaeological remains during maintenance carried out in the operations phase	C4 Medium	OP139	C1 Low

* assessed using Tables 3-19 and 3-20

In Table 10-22, the figures in brackets () are a rating of the cumulative impact reflecting the fact that these sites were also disturbed during the BTC/SCP or WREP projects. The assumption behind this is that if a site has been crossed more than once by various projects, the overall (cumulative) impact will be greater than if a single project crossed it. Using CH023 as an example, a rating of B3 (sensitivity followed by magnitude) has been given, using Tables 3-19 and 3-20, to assess the potential significance of disturbance from SCPX alone. CH023 is therefore rated as having a low impact significance with regard to the impact of SCPX in isolation. The text below the B3 rating (4 Medium) is the potential magnitude of the cumulative impact (4) arising from the fact that the site was crossed by one of the previous pipelines. This raises the significance level from a low to medium.

Table 10-22: Potential Impacts on Cultural Heritage at Specific Locations and/or Receptors

Location	KP	Sensitive Cultural Heritage	Potential Impacts	Potential Impact Significance *	Mitigation	Residual Impact Significance *
CH004	20	Transhumant settlement	Loss or disturbance of archaeology	A1 Low	27-05, 27-06	A1 Low

Location	KP	Sensitive Cultural Heritage	Potential Impacts	Potential Impact Significance *	Mitigation	Residual Impact Significance *
CH006	23	Transhumant settlement	Loss or disturbance of archaeology	A1 Low	27-05, 27-06	A1 Low
CH017	131	Pottery find-spot	Loss or disturbance of archaeology	A- Low	27-05, 27-06	A1 Low
CH019	139	Pottery find-spot	Loss or disturbance of archaeology	A- Low	27-05, 27-06	A1 Low
CH021	144	Pottery find-spot	Loss or disturbance of archaeology	A-Low	27-05, 27-06	A1 Low
CH023	148	Antique period cemetery	Loss or disturbance of archaeology	B3 Low (4 Medium)	27-05, 27-06	B – Low
CH024	160	Antique period cemetery	Loss or disturbance of archaeology	- - Low	27-05, 27-06	- - Low
CH025	164	Modern cemetery	Loss or disturbance of archaeology	D4 High	27-02, 27-10	D1 Low
CH026	170	Antique period pottery	Loss or disturbance of archaeology	- - Low	27-05, 27-06	- - Low
CH027	176	Antique period cemetery	Loss or disturbance of archaeology	C – Low	27-05, 27-06	C – Low
CH028	178	Iron Age cemetery	Loss or disturbance of archaeology	C – Low	27-01, 27-02, 27-05, 27-06	C – Low
CH029	179	Iron Age cemetery	Loss or disturbance of archaeology	C – Low	27-01, 27-02, 27-05, 27-06	C – Low
CH030	180	Pottery spread	Loss or disturbance of archaeology	- - Low	27-05, 27-06	- - Low
CH032	182	Antique period cemetery	Loss or disturbance of archaeology	- - Low	27-05, 27-06	- - Low

Location	KP	Sensitive Cultural Heritage	Potential Impacts	Potential Impact Significance *	Mitigation	Residual Impact Significance *
CH033	186	Antique period cemetery	Loss or disturbance of archaeology	B2 Low (3 Low)	27-01, 27-02, 27-04, 27-05 27-06	B1 Low (Low)
CH036	202	Pottery spread	Loss or disturbance of archaeology	A1 Low (1 Low)	27s-05, 27-06	A – Low (Low)
CH049	228	Animal bones encountered	Loss or disturbance of archaeology	- - Low	27-05, 27-06	- - Low
CH050	228	Animal bones encountered	Loss or disturbance of archaeology	- - Low	27-05, 27-06	- - Low
CH054	234	Medieval settlement	Loss or disturbance of archaeology	C3 Medium (4 Medium)	27-01,27-04, 27-05, 27-06	C1 (3) Low (Medium)
CH055	239	Burial of unknown date	Loss or disturbance of archaeology	- - Low	27-05, 27-06	- - Low
CH056	244	Medieval settlement	Loss or disturbance of archaeology	- - Low	27-01, 27-02, 27-05, 27-06	- - Low
CH057	244	Medieval settlement	Loss or disturbance of archaeology	B2 Low (3 Low)	27-01, 27-02, 27-05, 27-06	B1 (1) Low (Low)
CH059	246	Medieval settlement	Loss or disturbance of archaeology	B2 Low (3 Low)	27-01, 27-04, 27-05, 27-06	B1 (2) Low (Low)
CH060	247	Medieval settlement	Loss or disturbance of archaeology	C1 Low	27-01, 27-02, 27-05, 27-06	C1 Low
CH061	247	Medieval settlement	Loss or disturbance of archaeology	C – Low	27-01, 27-02, 27-05, 27-06	C1 Low

Location	KP	Sensitive Cultural Heritage	Potential Impacts	Potential Impact Significance *	Mitigation	Residual Impact Significance *
CH062	247	Medieval settlement	Loss or disturbance of archaeology	C2 Low (3 Medium)	27-01, 27-04, 27-05, 27-06	C1 (2) Low (Low)
CH066	262	Bronze Age settlement	Loss or disturbance of archaeology	D2 Medium (4 High)	27-01, 27-02, 27-05, 27-06, 27-12	D2 (3) Medium (Medium)
CH067	264	Medieval settlement	Loss or disturbance of archaeology	C2 Low (3 Medium)	27-01, 27-02, 27-05, 27-06	C1 (1) Low (Low)
CH068	266	Medieval settlement	Loss or disturbance of archaeology	B2Low (3 Low)	27-01, 27-02, 27-05, 27-06	B1 (2) Low (Low)
CH069	269	Medieval settlement	Loss or disturbance of archaeology	B2 Low (3 Low)	27-05, 27-06	B1 (2) Low (Low)
CH072	278	Nineteenth-century structures	Loss or disturbance of archaeology	B – Low	27-05, 27-06	B – Low
CH085	288	Modern cemetery	Access to the cemetery may be blocked due to construction activities	C4 Medium	X10-14	C1 Low
CH086	288	Medieval settlement	Loss or disturbance of archaeology	C2 Low (3 Medium)	27-01, 27-02, 27-05, 27-06	C1 (2) Low (Low)
CH091	301	Possible catacomb burial	Loss or disturbance of archaeology	C3 Medium	27-01, 27-02, 27-05, 27-06	C – Low
CH092	303	Bronze Age cemetery	Loss or disturbance of archaeology	D2 (3) Low (Medium)	27-01, 27-02, 27-05, 27-06	D1 (2) Low (Medium)
CH096	304	Human remains visible 2002	Loss or disturbance of archaeology	C - Low	27-05, 27-06	C – Low
CH097	304	Chalcolithic settlement	Loss or disturbance of archaeology	D2 (3) Medium (Medium)	27-01, 27-02, 27-05, 27-06	D1 (2) Low (Medium)

Location	KP	Sensitive Cultural Heritage	Potential Impacts	Potential Impact Significance *	Mitigation	Residual Impact Significance *
CH100	307	Chalcolithic settlement	Loss or disturbance of archaeology	D2 (3) Medium (Medium)	27-01, 27-02, 27-05, 27-06	D1 (2) Low (Medium)
CH111	325	Bronze Age cemetery	Loss or disturbance of archaeology	D3 Medium (5 High)	27-01, 27-02, 27-05, 27-06	D – Low
CH113	326.4	Bronze Age settlement	Loss or disturbance of archaeology	C - Low	27-01, 27-02, 27-05, 27-06	C – Low
CH117	346	Bronze Age cemetery	Loss or disturbance of archaeology	C - Low	27-05, 27-06	C – Low
CH118	346	Pottery spread	Loss or disturbance of archaeology	- - Low	27-05, 27-06	- - Low
CH122	353	Antique period settlement	Loss or disturbance of archaeology	C2 Low (3 Medium)	27-01, 27-02, 27-05, 27-06	C1 (2) Low (Low)
CH123	356	Chalcolithic settlement	Loss or disturbance of archaeology	C2 Low (3 Medium)	27-01, 27-02, 27-05, 27-06	C1 (2) Low (Low)
CH127	379	Chalcolithic cemetery	Loss or disturbance of archaeology	D- Low	27-01, 27-02, 27-05, 27-06	D – Low
CH130	385	Chalcolithic settlement	Loss or disturbance of archaeology	D- Low	27-01, 27-02, 27-05, 27-06	D- Low
		Construction camp, rail spur, offloading and pipe storage areas	Potential for damage to sites, if present, caused by heavy vehicle movements	B1 Low	27-01, 25-13	B1 Low
		Commemorative public water fountain adjacent to the corner of the site Samukh Camp Option 3	Impacts of dust and noise on users of fountain adjacent to the corner of the site	B3 Low	X10-15	B2 Low

* assessed using Tables 3-17 and 3-18

10.10.4 Mitigation

10.10.4.1 At the design stage

The location of the SCPX Project has been routed, where possible, to avoid or reduce impact on the majority of known cultural heritage features. A number of specific alterations to the designed route have been made including:

- Amirarx Antique burial site (CH023)
- Faxrali Medieval settlement (CH054)
- Seyidlar Bronze Age settlement and recent cemetery (CH066)
- Chaparli Antique period chapel and cemetery (CH079)
- Bayramli settlement mound (CH089)
- Zeyamchay Bronze Age and medieval cemetery (CH092)
- Tovuzchay Bronze age cemetery (CH111)
- Girag Kasaman I medieval settlement and recent cemetery (CH120)
- Girag Kasaman II Antique settlement (CH122)
- Poylu II Prehistoric settlement (CH123).

Prior to selection all access routes will be subject to a multidisciplinary assessment (37-20).

10.10.4.2 Pre-construction and construction phases

The SCPX ROW generally follows the route of the existing BTC and SCP routes. Consequently, there is good information on the potential for archaeological sites in this area. Areas of potential cultural heritage impact will be examined and any necessary excavations conducted prior to construction (27-02). The following cultural heritage sites are part of the SCPX phase 2 evaluation; if significant archaeological evidence is located, a further Phase 3 mitigation excavation programme will be planned in these locations:

- Samedabad Iron Age cemetery (CH028)
- Narimankand Iron Age cemetery (CH029)
- Antique settlements around Seyidlar II and Garajamirli (CH067 and 068)
- Zeyamchay Bronze Age cemetery (CH092)
- Chalcolithic and Bronze Age settlement sites at Agili Dere and Khojakhan (CH097 and CH100)
- Bronze Age cemetery at Tovuzchay (CH111)
- Bronze Age settlement at Khunan (CH113)
- Antique and prehistoric settlements at Girag Kasaman II, Poylu II and Poylu I (CH122, 123 and 124)
- Chalcolithic cemetery and settlement at Soyuqbulaq and Beyouk Kasik (CH127 and 130).

The following sites can be identified as requiring mitigation excavation before construction, as they have known deposits that cannot be avoided by altering the pipeline route. The Phase 2 programme may identify further sites that need additional work within the Phase 3 excavation programme:

- Antique period cemetery Yaldili (CH033)
- Medieval settlement Faxrali (CH054)
- Medieval settlement Dashbulaq (CH086).

There are a number of areas where small, discrete, archaeological features were encountered on the BTC and SCP pipelines, most commonly in the Yevlakh area. There is a risk that these areas may contain similar features, but as they leave no surface indication and are usually buried around 1m deep, they are difficult to identify and record before construction.

These sites will be examined as part of the Phase 4 works of the archaeological programme, which occurs during construction. All works in these areas will be carefully monitored by an archaeologist, which will be specifically looking for evidence in these areas, in addition to the other earthmoving areas on the Project. The locations are:

- Pottery spreads in Ujar Rayon (CH016, CH017)
- Antique period burial vessels and pottery in Agdash Rayon (CH019, CH021, CH023)
- Antique period burial vessels and pottery in Yevlakh Rayon (CH024, CH026, CH027, CH030, CH0032)
- Post-medieval pottery in Goranboy Rayon (CH036)
- Medieval and earlier settlements around Hajialili (CH056–7, CH059–62).

Modern cultural resource management practice seeks to preserve archaeological deposits in situ. Preservation of cultural heritage remains allows future generations an opportunity to examine archaeological sites and monuments with more resources and better techniques to recover greater quantities of information about past societies. Where this is not practical, excavation is carried out to record observations, evidence and finds made by the excavator at the excavated site.

A Cultural Heritage Management Plan will be implemented that includes a five-phase strategy for the progressive assessment and mitigation of the effects of construction (27-01). The five-phase strategy is given below in Table 10-23. Areas of potential cultural heritage impact will be examined and any necessary excavations conducted prior to construction (27-02). Archaeological sites identified during construction will be archaeologically recorded (27-03). Issues relating to archaeological awareness (such as ownership of finds, notification of finds and protection of archaeological sites) will be included in induction training (27-11). No hunting, fishing or unauthorised gathering of products (including plants and cultural heritage artefacts) by the workforce will be permitted within the Project footprint (19-05).

Table 10-23: Summary of the Five-Phase Strategy

Phase	
Phase 1	Baseline surveys including desktop studies, walk-through surveys and examination of aerial photographs leading to the development of a Cultural Heritage Management Plan
Phase 2	Intrusive work: trial pits and preliminary investigation of potentially significant sites
Phase 3	Full investigation of major confirmed sites
Phase 4	Activities during construction: watching brief and excavation of newly discovered sites
Phase 5	Post-construction work: analysis of finds, archiving and reporting, dissemination of the results

Pre-construction works to evaluate and record known archaeological sites will be agreed with the Ministry of Culture (27-04). Despite undertaking baseline surveys and trial excavations throughout the area of project impact, the possibility of unearthing archaeological artefacts during topsoil stripping or trenching cannot be precluded. A programme of archaeological surveillance (watching brief) will be implemented during topsoil stripping of the ROW, the facility sites, construction camps and equipment lay-down areas and ancillary areas, and ROW trenching. The Company will be empowered to temporarily stop works, pending archaeological examination, if artefacts are seen (27-05).

At Samukh Camp Option 3, the memorial public water fountain (bulag) of recent origin will be excluded from the fenced area of the camp. There will be a buffer zone agreed with the appropriate stakeholder representative between the building and the camp boundary fence. Access will be kept open to the structure. Project will communicate with the stakeholder

representative to understand concerns and institute appropriate monitoring as required (X10-15).

If normal access to the cemetery in Dallyar Dashbulak village would be impacted by Project activities, an alternative footpath for local residents will be provided. The ROW will also be designed so that the shelter outside the cemetery is avoided (X10-14).

If archaeological artefacts or structures are found, archaeological advice will be sought from Azerbaijan Academy of Science, Archaeology and Ethnography Institute and the Ministry of Culture and the Chance Finds Procedure followed (27-06). This will be done in accordance with the Cultural Heritage Management Plan (see Appendix D). The archaeologist conducting the watching brief will advise on procedures to be followed by the construction supervisor in line with the Chance Finds Procedure (27-07). The Company will consider making minor adjustments to the route of the pipeline where this will avoid damage to a cultural heritage feature that is discovered during construction operations (27-08). If the pipeline route cannot easily be adjusted to avoid damaging the feature, construction activities will be suspended at the site until the excavation and recording required by the authorities has been carried out (27-09).

Known archaeological sites within 50m of the pipe centreline, or other construction activity will be demarcated throughout construction (27-10). Vibration-sensitive locations will be determined by the Contractor and listed in their Pollution Prevention Implementation Plan, together with details for monitoring vibration before and during movement of heavy equipment. Further actions will depend on the outcome of vibration monitoring (25-13). Correct tyre pressures will be monitored and maintained (25-16). Any ripping or other ground disturbance activities required during reinstatement will be planned to avoid archaeological evidence that has been preserved in-situ (27-13).

10.10.4.3 At the operational stage

Following construction of the Project, impacts on cultural heritage will decline to an extremely low level assuming normal operation parameters. However, there will be occasions when fresh ground disturbance may be needed, such as activities to repair sections of buried pipe that develop faults. This operation may impact upon buried archaeological features that are in close proximity to the pipe and have been protected from damage during construction. The following mitigation measure will be adopted to reduce impacts to known archaeological features during the operational stage of the proposed SCPX Project.

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).

10.10.5 Residual Impacts

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 assist in mitigating this impact, but there will be a residual impact unless damage is averted completely by use of an alternative route. This impact is shown in the residual column of Table 10-21 and Table 10-22, although it is difficult to be definitive of the actual score of any impact until the archaeological recording has been completed.

A number of the residual impacts are cumulative impacts on archaeological sites that were previously discovered. The assumption behind this is that if a single large site has been crossed more than once by various projects, the ultimate cumulative impact will be greater than if a single project crossed it. This is especially so if all the projects utilised impact reduction techniques, so that a greater proportion of the site survived. A medium residual

impact is predicted to occur at sites CH054, CH066, CH092, CH097 and CH100 owing to the cumulative impact of sites being crossed previously.

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 archaeological programme of work before construction (Phases 2 and 3) and during monitoring of construction activities (Phase 4). This will bring positive benefits, increasing the understanding and awareness of the history and development of the territory of Azerbaijan. A further benefit for the area will be the number of people employed on archaeological excavation and research.

Through implementation of the mitigation measures, the negative impact on the archaeological resource of Azerbaijan will be reduced to low significance and the positive benefits will be maximised to the greatest extent practical. At an individual site level, the residual impact significance is likely to be low or medium in the majority of instances but there remains a low risk of substantial damage of an important site or feature.

Sensitive areas where unavoidable impacts will occur will be fully recorded and published in academic journals. In this way, the information can be made available for the people of Azerbaijan and other nations, which will be beneficial.

At Samukh Camp Option 3, the impacts on the use of the recently built memorial public water fountain (bulag) adjacent to the corner of the proposed site are predicted to be low.

The areas proposed for temporary facilities have no known impacts. A survey will be undertaken before construction commences in these areas.

10.11 Demographics

This section covers potential impacts on demographics during construction and operation of the proposed SCPX Project and associated mitigation measures to be adopted.

10.11.1 Aspects of SCPX Project that Could Affect Demographics

Opportunities presented by the proposed SCPX Project during construction, such as increased job availability and creation of a larger and more diverse market for provision of goods and services can cause secondary demographic changes (for example, the birth rate may increase due to improved standard of living and health care and out-migration may decrease).

Employment opportunities during construction are discussed in more detail in Section 10.14.3, which should be referred to for more detail. The construction phase in Azerbaijan is due to commence with early works in late 2014 and main works from spring 2015 to the end of 2017. Direct employment on the pipeline will vary during the construction period with lower numbers employed at the beginning and end of the construction period rising to a maximum of approximately 700 workers based in the camps during the main work period, see Section 5.5.2 for more information. The majority of the workforce will be based at the construction camps that will be established along the route in the Kurdemir, Ujar, Ganja and Agstafa areas.

There are no specific impacts on demographics related to commissioning.

During the operational period, only a very limited number of additional staff will be needed as the staff that operate and maintain the existing pipelines will also cover the SCPX pipeline. No demographic impacts are therefore predicted during operation and this impact is not discussed further.

10.11.2 Key Sensitivities

For the Project affected communities (PACs) surveyed, the sensitivities with respect to demographics and the potential SCPX Project are:

- Sensitivity to in-migration: almost 90% of households have lived in their existing community for over 21 years, and population levels have slowly but steadily increased. Therefore, the communities are likely to be sensitive to sudden changes caused by in-migration.
- Sensitivity to religious and ethnic tensions from both in-migration and presence of foreign workers in camps, owing to low religious and ethnic diversity in the PACs.
- Presence of vulnerable households in the PACs surveyed and the greater risk of them being affected by socio-economic changes: 44% of households define themselves as “very poor” and unable to afford food. This group is at higher risk of impacts from the Project, and any loss of income and livelihood as a result of Project activities would likely affect this group.
- The vulnerable group are more at risk of impacts from the Project compared to the general public/PACs mainly owing to poorer housing conditions, poorer health care situations and a reliance on pensions as their only source of income.

10.11.3 Demographic Impacts

The main factors that will determine the type and scale of demographic impacts are:

- The number of available jobs and their duration in the construction phase. The construction phase is the main determinant of the total number of jobs created and their duration – very few jobs will be created in the operations phase and this is therefore not discussed further in this section
- The Project’s target on local recruitment (local/non-local/foreign employees ratio)
- The extent to which it is understood and believed that jobs will only be allocated to applicants who apply via the formal Project procedure
- Ability of local people to benefit from these opportunities in competition with non-locals who have skills needed by Project activities
- Community adaptability and acceptance of opportunities benefiting non-locals more than locals (whether a perceived or real situation)
- Housing availability and affordability as a result of increase in demand
- Physical (such as water supply) and social (such as schools and healthcare facilities) infrastructure capacity and quality of service provision.

Currently, both unemployment and under-employment are relatively high in many PACs and incomes are relatively low. The existing population of the surveyed PACs is also increasing mainly due to natural increase (excess of births to deaths). Migration is low or stable in most of the PACs, and most people have lived in their community for over 21 years. About 45% of migrants who migrated within the past 20 years were seeking more favourable living conditions. Therefore, it is possible that any sudden changes as a result of Project activities could lead to number of temporary direct and indirect impacts on the demographic situation of the Project area as described below.

The location of demographic impacts may vary. It is not possible to predict the scale of impacts in specific localities but impacts may be more likely in the communities close to the camps, where the majority of jobs will be created. Communities local to preferred camps, pipe storage areas and rail spur and offloading areas include Mugan, Yevlakh city, Sarov, Taza Shilyan, Duzdak, Samedabad, Nerimanabad, Cirdaxan, Ismayilabad, Kurdemir, Yeni Shiximly, Choxhranly, Ujar, Garaberk, Borsunlu, Qazanbulaq, Nadirkend, Agstafa, Goychali, Girili, Qarqucaq, Dallar, Mususlu, Pirili, Garayeri, Govlarsari, Goranli, Sarigamish, Gazanchi,

Gazakhlar, Saloghlu, Gayzan and Ujar. Other communities close to the pipeline may also attract in-migration.

10.11.3.1 Proposed pipeline construction and commissioning, including pigging station, block valves, construction camps, pipe storage areas and rail spur and offloading areas

Birth rate
An increase in local employment is likely to lead to a direct increase in personal and household incomes. An increase in personal and household incomes, coupled with enhanced income stability, may have the secondary impact of increasing PAC birth rates, the extent of which will depend on how many workers are employed and the length of employment.

Given the temporary nature of the construction phase no significant impacts are predicted. However, there may be a low negative impact as, coupled with the existing trend of population increase in the majority of the PACs surveyed, it could lead to an increase in local demand for services and infrastructure. The existing local infrastructure and services (mainly water supply and gas) are of poor condition in the PACs surveyed, and cannot fulfil the demand of population increase.

In contrast, the increase in birth rate may have a small beneficial impact in two PACs, Ramal and Alikend, as populations are declining in these PACs due to an excess of deaths over births.

Out-migration and unplanned in-migration
An increase in the number of jobs and birth rate may have the secondary impact of reducing out-migration of local people who have been migrating to the other areas for better economic or living conditions. The potential reduction in out-migration is classed as a beneficial impact.

Unplanned in-migration occurs when individuals, families/households move from one location to another to try to obtain a job or to exploit economic opportunities created by a project.

Although socio-economic conditions were different when the BTC/SCP projects were implemented, that experience would indicate that unplanned in-migration remains a distinct possibility.

The direct impact of un-planned in-migration is increase of local population. As it is unplanned, it can create various secondary impacts on host communities, particularly small, rural settlements. The main secondary impacts caused by un-planned migration are related to infrastructure capacity and service delivery. The results of the household survey indicate that some PACs do not have access to gas, and there are problems associated with lack of sewerage system and waste disposal facilities. Any increase in population could lead to additional infrastructure use which could potentially cause major impacts on the capacity of local infrastructure services to deliver desired benefits. For example, some migrants may bring their families and thus local schools may face difficulty in serving the newcomers if capacity were to be exceeded.

The other possible secondary impacts of un-planned in-migration could be:

- Impact on housing availability, creation of temporary dwellings and increase in rents
- Increase in traffic and road accidents (discussed in Section 10.12.2.1)
- Social disruption and tensions caused by presence/behaviour of ‘strangers’ (discussed in Section 10.12.3)
- Local competition over jobs which may result in social tensions and stress

- Increase in crime as a result of any potential conflict between the locals and the newcomers (discussed in Section 10.12.3)
- Increase in cost of products as a result of localised inflation, which will affect locals' purchasing power (discussed in Section 10.14.3).

10.11.3.2 Impact summary and assessment of significance

Table 10-24 summarises the potential demographic impacts of the construction phase.

Table 10-24: Potential Generic Demographics Impacts

Issue		Potential Impact	Potential Impact Significance*	Mitigation	Residual Impact Significance*
A28 A29	Employment Provision of goods and services	Increase in birth rate	C2 Low	28-01, 28-02 28-03, 28-04, 28-08, 28-18	C1 Low
A28 A29	Employment Provision of goods, services	Reduced out-migration	Beneficial		Beneficial
A28 A29	Employment Provision of goods and services	Unplanned in-migration increases	C3 Medium	28-01, 28-02, 28-03, 28-05, 28-07, 28-18	C1 Low

* assessed using Tables 3-21 and 3-23

10.11.4 Mitigation of Impacts

10.11.4.1 Proposed pipeline construction and commissioning, including pigging station, block valves, construction camps, pipe storage areas and rail spur and offloading areas

To try to reduce in-migration it will be important to manage expectations, outside the PACs, to remove any perception that a prospective in-migrant will benefit from SCPX works. To help minimise the extent of in-migration, the Project's strategy on local recruitment will be disseminated publicly, including via media announcements at regional and national levels (as appropriate) (28-01). The Project will also seek to manage employment expectations by explaining the number and type of opportunities in advance to local communities via the Community Liaison Officers (28-05) and by providing clear job descriptions in advance of recruitment explaining the skills required for each post (28-07). Unskilled labour will be preferentially recruited from the Project Affected Communities (28-02). Applications for employment will only be considered if submitted via the official application procedure (28-03). Targets for local recruitment from PACs will be agreed with the Contractor. These will be designed to meet legal requirements (28-04). Community Liaison Officers will monitor that PACs are given priority in recruitment and that recruitment is non-discriminatory in terms of PACs and ethnicity (28-08).

A Plan will be developed and implemented that will aim to discourage and prevent the workforce from purchasing goods from informal vendors to discourage vendors from establishing themselves at construction camp fence-lines in the hope of securing additional business (28-18).

10.11.5 Residual Impacts

The implementation of the proposed mitigation measures will help to reduce the number of in-migrants; thus, the residual impact is considered 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 SCPX Project and associated mitigation measures to be adopted. The information on community health and safety impacts (not including security issues) is based on the results of a parallel health impact assessment (HIA), which was carried out in close cooperation with the 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 will be 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 have 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 SCPX Project that Could Affect Community Health, Safety and Security

10.12.1.1 Community health

The main Project-related 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 main Project-related activities that may result in impacts to community safety and security are:

- 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 and wastewater
- Behaviour of security personnel.

The above activities are confined primarily to the construction and commissioning phase with limited (if any) impacts predicted during the operations phase.

10.12.2 Key Sensitivities

10.12.2.1 Community health

For the communities surveyed and specialist advice, the potential sensitivities identified with respect to health are:

- High tuberculosis (TB) rates and the prevalence of multi-drug resistant TB which is amongst the highest in the European Region
- High prevalence of infections of the ear, throat, and nose (including influenza and colds), in the PACs, is 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, tularaemia, *Yersinia pestis*, tuberculosis and malaria are endemic in Azerbaijan
- Increasing rates of sexually transmitted infections (STIs) such as HIV/AIDs
- Reduction of epidemiological monitoring owing to lack of funding
- Lack of sewage systems in most PACs thus disposal of sewage and waste from most households is to an open drain or ditch
- Lack of water supply inside most PAC households and accessibility to safe drinking water
- Affordability of medicines is reducing for many PAC residents. Ease of access is one of the key problems faced by many communities.

10.12.2.2 Community safety and security

The key sensitivities with respect to community safety, security and including community relations are:

- Increase in road traffic injuries and deaths since 2000 in Azerbaijan in line with increasing car ownership. This increase in car ownership is occurring in rural communities as well as in urban areas.
- Residents of PACs that are not located near to the BTC/SCP pipeline and AGIs have limited knowledge of the hazards inherent in construction sites and the risks of living and working close to such sites
- Children in particular 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 Proposed pipeline construction and commissioning, including pigging station and block valves

Many of the PACs along the BTC/SCP pipeline have experience of pipeline laying/pipeline repair from previous pipeline construction and subsequent operations/maintenance activities. Experience of similar projects is not equally distributed amongst the population; older people are more familiar than younger and new residents. New PACs that have developed since the BTC/SCP construction along the proposed SCPX route will be unfamiliar with construction and operation activities.

The main factors that will determine potential impacts are the activities associated with pipeline construction, which will involve trench excavation, preparation of the ROW, and installation of pipes and block valves. Roads in the outlying communities in Azerbaijan in general are not in good condition, although in recent years there have been some major road improvements, including the Silk Road Project. To transport materials and workers from and to the Project sites, some roads need to be upgraded. During PAC consultations, local residents were mainly concerned about the impact of SCPX construction on the existing roads particularly where houses are located close to roads. The increase in movement of vehicles and trucks during the construction stage will affect the condition of roads and will lead to increased risk of accidents and injuries.

During pipeline construction, security measures will be implemented in the pipeline ROW. As a result of the pipeline security measures, some locals may experience difficulties to access to their sites or lands. The possible access difficulties may lead to local disturbance and potential conflicts between the locals and security personnel. Local residents expressed their concern with regard to past BTC/SCP project security restrictions during the SCPX PAC consultations. A number of indirect and secondary impacts are further discussed in Section 10.12.3.2 that are applicable to the pipeline construction and commissioning stage.

The most likely potential direct (primary) impacts on community health, safety and security are considered likely to be:

- Disturbance to sleep patterns from increased noise levels
- 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. In locations where an access road passes through a PAC, SCPX activities will result in significantly increased traffic flows on certain roads that are used by local residents
- Risk of conflict between community members and security personnel and foreign construction workers, potentially including the commitment of crimes
- Increased risk of water-borne diseases if liquid and solid waste management procedures are not implemented effectively.

The essential secondary impacts being considered in the assessment are listed below:

- Changes in air quality may cause some respiratory problems for people who are particularly sensitive to this type of complaint, but it is unlikely that exposure to fine particles (PM10) will be sufficiently prolonged to increase the risk of serious respiratory illnesses
- Increase in disease vectors such as rodents (if food and drink is not stored properly and solid and liquid wastes are not managed adequately) with accompanying increased incidence of vector-borne diseases.

Potential injury as a result of unplanned events during project operation is included in Chapter 12.

10.12.3.2 Proposed construction camps, pipe storage areas and rail spur and offloading areas

PACs located near camps, pipe storage and rail spur and offloading areas used during the BTC/SCP pipeline construction will have experience of the activities associated with these work areas. The proposed locations include areas used previously during BTC/SCP and a number of new locations. A number of PACs at the proposed locations for camps, pipe storage areas and rail spur and offloading areas will be unfamiliar with construction and operation activities.

The camps were assessed as 'open', as this represented the worst-case scenario for assessment purposes. Camps, pipe storage areas, rail spur and offloading areas and increased volumes of traffic on roads have been considered in the assessment. The construction camps most likely will be 'dry closed' camps, and camp workers will only be allowed to consume a limited amount of alcohol while in the camps. Strict security measures will be in place to manage the movement of workers in/out of the camps. It is expected that other nationalities apart from Azerbaijanis will also be working in the camps.

Some of the camps are located close to communities, for example Ujar Camp Option 5 is close to Garaberk. Potentially, camp workers may use their spare time to visit local amenities and use public recreation facilities. The possible use of alcohol by camp workers while in communities, possible drug abuse and cultural differences between the local workers and workers of different nationalities from outside the locality, could lead to social tensions and stress among the locals. The community safety of locals could be at risk as a result of possible conflict between the locals and the workers from outside of the local community.

Each day large number of buses and cars will be used for transport of workers from the camps to the work areas and vice versa. There is the potential at each camp for 80–100 movements a day, on average, with peaks up to 160–180 for plant and other traffic. As a result of workers' movements between the pipeline site and the camps, it is expected that local people will be exposed to a higher risk of road accidents and injuries. In particular, Ujar and Kurdemir.

The access road to the Mugan Pipe Storage Area passes through the local community but traffic volumes will be low, as the pipe itself will be transported northwards from the pipe storage area to the ROW along a track that heads away from the community.

The transport of pipe from the Kurdemir Pipe Storage Area Option 1 (Mususlu) to the ROW will involve crossing the main east-west highway, leading to a risk of accidents with traffic on the highway at the crossing point. Pipe storage deliveries to the right of way from the rail spur to Pipe Storage Area Option 2 (Mususlu) and from the rail spur and pipe storage area to the RoW at Poylu could potentially impact residents.

The following community safety and security impacts are considered likely to occur as a result of construction camps and associated work at pipe storage areas and rail spur and offloading areas:

Direct (or primary) impacts

The impacts below are both primary and secondary in nature. The potential direct health, safety and security impacts considered likely to occur are:

- Accident and injury to local people and livestock particularly from traffic on access roads if traffic passes through communities
- Accident and injury to local people and livestock due to open trenches and associated physical hazards such as falling or tripping

- Increased risk of enhanced incidences of communicable diseases (e.g. TB and sexually transmitted diseases such as HIV/AIDS) arising from interaction between workers living in the construction camps with local people. With potentially between 400–600 people per main construction camp (mostly men) living in five construction camps there will be a potential risk of communicable diseases or infections passing through the workforce, and possibly into the communities or from the communities to the camps
- Exposure to and transmission of zoonotic diseases (e.g. anthrax, brucellosis, rabies)
- Exposure to hazardous materials via releases or spills associated with accidents, spills and leaks
- Potential contamination of water used for drinking, irrigation and industrial use as a result of spills or leaks impacting surface or ground water
- Tensions resulting from cultural differences, anti-social behaviour of construction workforce, potential prostitution and attraction of 'hangers on' at camp sites
- Risk of conflict between community members and security personnel
- Risk of death or deterioration of patient's condition as a result of delays in reaching a medical facility if journey times are increased through re-routing of traffic, or blocked access routes.

The secondary impacts being considered in the assessment are listed below:

- Potential air emissions from waste incineration at camps and potential for respiratory issues in PACs
- The potential for chemicals in hydrotest water to be discharged to surface and groundwater without treatment
- Non-communicable diseases and the potential for workers to pass to each other and the community
- Increases in drug and alcohol abuse in the PACs due to increased income
- Transmission of a food-related illness from the Project to the community and vice versa
- Local disturbance associated with noise emissions, vibration and dust to nearby residents that are located in close proximity to the camps, pipe storage areas and rail spur and offloading areas: Mugan Rail Spur, Offloading Area and Pipe Storage Area, Kurdemir Rail Spur and Pipe Offloading Area, Kurdemir Pipe Storage Area Option 1 (Mususlu), Ujar Camp Option 5, Yevlakh Rail Spur and Offloading Area and Yevlakh Pipe Storage Area, Gazanchi Rail Spur and Offloading Area and Gazanchi Pipe Storage Area Option B, Dallar Rail Spur, Offloading and Pipe Storage Areas, Dallar Pipe Storage Area Option 1B (Bayramli), Samukh Camp Option 3, Poylu Rail Spur, Offloading and Pipe Storage Areas, Saloghlu Rail Spur and Offloading Area and Saloghlu Pipe Storage.

Indirect impacts
The following potential indirect community health, safety and security impacts are considered likely to occur:

- Post-trauma effects to the individuals involved in accidents, the consequential effects to their families and any necessary rehabilitation. Particularly associated with a multi-vehicle road traffic accident
- Infections, diseases and exposure to hazardous materials are considered both indirect and direct owing to symptom development sometime after initial exposure
- Behavioural changes brought about by changes in employment or income status leading resulting programme management.

Beneficial impacts

There is anticipated to be a potential beneficial health impacts for locals who will be employed by the project. Local workers will be able to use Project health facilities, leading to a beneficial impact of 'improved health of population employed or dependent on people employed by the Project'.

There is the potential for positive impacts by coordinating with existing Ministry of Health programmes, which will be explored further during early planning for the camp facilities.

The camps are temporary in nature and will be removed following construction with the land reinstated. Therefore, site-specific impacts during the operational stage of the project are expected to be negligible.

10.12.3.3 Pipeline operation

During the operation stage, there are not expected to be any major community health and safety impacts associated with increased traffic. Operational staff will be located at the Sangachal terminal. It is envisaged that the pigging station and the block valves will not be manned on a permanent basis by operational staff, although security personnel will be present. There will be fewer movements of buses and cars to and from the pipeline route. It is also expected that there will be minor health, safety and security risks associated with the transition to pipeline operation as construction workers leave the Project area. There is considered significantly less risk of conflict between the locals and Project workers during the operational stage.

There are livestock pens and a temporary dwelling within the construction ROW and proposed safety zone for the SCPX Project at BVR A6. The pens and temporary dwelling will be relocated prior to construction.

10.12.3.4 Site-specific impacts

Shusha IDP settlement is a PAC located 0.4km from the pipeline. This community suffers from poor infrastructure and housing conditions. The houses in this settlement are mainly made from reeds. The PAC consultation results indicated that local residents have concerns with regard to SCPX pipeline construction damaging their houses, as they believed that BTC/SCP construction activities had affected their houses previously.

A number of houses in Alpout, Chiyny, Dallyar Dashbulak and Garaberk have been identified as located within 100m of the pipeline. The local residents in these areas will be affected by noise emissions and dust as a result of pipeline construction and movement of cars and vehicles. The vibration associated with pipeline construction has the potential to damage the houses located in these areas, and the dust could potentially pose respiratory risks to local residents.

The resident(s) in the temporary dwelling associated with the livestock pens near BVR A6 may experience increased noise or dust as a result of Project activities despite being relocated at least 200m from the edge of the ROW.

A dwelling and livestock pen located at SCPX KP62.2 may experience increased noise or dust as a result of Project activities as they are located 20m from the ROW.

10.12.3.5 Impact summary and assessment of significance

The key community health, safety and security impacts (those with an unmitigated impact of low significance and above), identified by the HIA, have been summarised and discussed below in accordance with the methodology outlined in Chapter 3.

Table 10-25 summarises the potential generic impacts prior to mitigation and residual impacts after application of mitigation measures, and Table 10-26 discusses site-specific impacts.

Table 10-25: Potential Generic Impacts on Community Health, Safety and Security

Issue	Environmental Health Area	Potential Impacts	Potential Impact Significance, Probability*	Mitigation	Residual Impact Significance, Probability*
A30	Accidents/injuries – road traffic-related injuries, spills and releases; community access to construction sites Potential delays in the transport of locals to medical facilities caused by Project traffic	Risk of accident to local people and livestock, particularly from open excavations	High, 6	3-34, 21-01, 30-02, 30-08, 30-09, 19-04, 30-04, 30-06, 30-17, 30-18, 30-23, 32-08, 32-09, 33-01, 33-15, 33-16, 33-19, D30-01	High, 5
		Risk of accident to local people and livestock particularly from traffic	High, 6	2-02, 6-12, 20-03, 21-02, 24-02, 37-03, 37-04, 30-15, 30-18, 30-21, 30-22, 30-23, 30-24, 33-01, 37-09, 19-07, 37-10, 3-09, 37-05, 37-06, 30-08, 33-19, 33-15, 33-16	High, 5
		Risk of conflict between community members and security personnel leading to injury	Medium, 6	30-10, 30-12, 30-15, 33-01, 33-15, 33-16	Low, 3
		Risk of deterioration of patient's condition as a result of delays in reaching a medical facility	Medium, 6	31-02, 31-03, 33-01, 33-15, 33-16	Medium, 5
A31, A24	Exposure to potentially hazardous materials	Spills impacting surface water and groundwater leading to community health impacts	Medium, 6	31-04, 6-03, 6-10, 6-11, 6-12, 6-20, 33-01, 33-15, 33-16	Medium, 3
		Air emissions from camps and facilities	Medium, 6	23-05, 31-06, 33-01, 33-15	Low, 3
		Incremental addition of road dust	Medium, 6	23-05, 23-06, 33-01, 33-15, 33-16	Medium, 3
		Potential for field related activity leaks and spills leading to soil contamination which may result in community health impacts	Medium, 6	31-04, 6-10, 6-12, 6-20, 33-01, 33-15, 33-16	Low, 3
A31	Soil, water, sanitation and waste-related diseases	If chemicals are added to hydrostatic test water this could have health impacts	Medium, 6	10-08, 31-05, 33-01	Low, 3

Issue	Environmental Health Area	Potential Impacts	Potential Impact Significance, Probability*	Mitigation	Residual Impact Significance, Probability*
		Outbreaks of infection in camps, which could be transferred to PACs	Medium, 6	7-04, 31-06, 31-21, 33-01	Medium, 3
A31	Non-communicable diseases	Non-communicable diseases in local construction workers	Medium, 7	31-10, 31-11, 33-01	Low, 5
A31	Social determinants of health (SDH)	Increase in drug and alcohol abuse in the PACs due to increased income	Medium, 7	30-15, 31-12, 31-13, 33-01	Medium, 7
		Improved health of population employed or dependent on people employed by the Project as a result of disease awareness and reduction programmes etc.	Beneficial		Beneficial
A31	Sexually transmitted infections	Increase in prevalence of STIs in camp and PACs	Medium, 6	31-14, 31-15	Medium, 3
A31	Housing and respiratory issues	TB outbreaks within the camp and PACs	Medium - Low, 5	31-16, 31-17, 31-18, 33-01	Low, 3
A31	Food and nutrition related issues	Transmission of food related illnesses from Project to community and vice versa	Low, 6	31-19. 31-20, 31-21, 19-08	Low, 4
A31	Zoonotic diseases	Risk of zoonotic disease transfer to Project and communities	Medium, 3	6-22, 6-25, 31-22, 33-01	Low, 3
A31	Vector-related diseases	Risk of vector-related diseases to Project staff	Low, 2	19-08, 31-23, 33-01	Low, 2

Assessed using Table 3-26, the probability of each impact occurring was then evaluated on a graduated scale with 1 = Remote and 8 = Relatively Common

Table 10-26: Community Health, Safety and Security Impacts at Specific Locations and/or Receptors

KP	Location	Potential Impacts	Potential Impact Significance Probability*	Mitigation	Residual Impact Significance*
KP21	BVR A06 KP21	Disturbance and reduced air quality for resident(s) at the nearby livestock pens as a result of dust	High, 4	D8-04, X8-04, 23-05, 23-06, 24-01	Low, 1

KP	Location	Potential Impacts	Potential Impact Significance Probability*	Mitigation	Residual Impact Significance*
		Disturbance, lack of sleep for resident(s) at the nearby livestock pens as a result of noise	Low, 2	D8-04, X9-03, 25-04, 25-05, 25-09, X9-04	Low, 2
	KP62.2	Disturbance and reduced air quality for resident(s) and the livestock pen as a result of dust	High, 4	D8-04, X8-04, 23-05, 23-06, 24-01	Medium, 3
	Shusha IDP KP59	Potential risk of damage to houses as these are made from reeds – issue associated vibration	Medium, 3	25-13, 25-14	Low, 1
	Chiyny Village, KP104–KP108	Disturbance, lack of sleep for villagers and shift workers as a result of noise	Low, 2	X9-04, 25-04, 25-05, 25-09	Low, 2
		Disturbance to residents as a result of dust, reduced air quality	High, 4	X8-04, 23-05, 23-06, 24-01	Medium, 3
	Garaberk village, KP116–KP120	Disturbance, lack of sleep for villagers and shift workers as a result of noise	Low, 2	X9-04, 25-04, 25-05, 25-09	Low, 2
		Disturbance to residents as a result of dust, reduced air quality	High, 4	X8-04, 23-05, 23-06, 24-01	Medium, 3
	Alpout village, KP121–KP125	Disturbance, lack of sleep for villagers and shift workers as a result of noise	Low, 2	X9-04, 25-04, 25-05, 25-09	Low, 2
		Disturbance to residents as a result of dust, reduced air quality	High, 4	X8-04, 23-05, 23-06, 24-01	Medium, 3
	Dallyar Dashbulak village, KP287–KP289	Disturbance, lack of sleep for villagers and shift workers as a result of noise	Low, 2	X9-04, 25-04, 25-05, 25-09	Low, 2
		Disturbance to residents as a result of dust, reduced air quality	Medium, 3	X8-04, 23-05, 23-06, 24-01	Medium, 2
	Agstafa Camp Option 3	Reduced air quality from waste incineration in local area, if installed	Low, 2	X8-05, 7-13	Low, 1

KP	Location	Potential Impacts	Potential Impact Significance Probability*	Mitigation	Residual Impact Significance*
	Dallar Pipe Storage and Dallar Rail Spur and Offloading	Disturbance to residents as a result of dust	Medium, 3	X8-04, 23-05, 23-06, 24-01, 24-02	Medium, 2
		Noise disturbance of residents as nearest houses 50m from site, but on other side of road	Low, 2	X9-03, X9-04, 25-03, 25-04, 25-05, 25-08, 25-09, 37-10	Low, 2
	Dallar Pipe Storage Area Option 1B (Bayramli)	Disturbance to residents as a result of dust	Medium, 3	X8-04, 23-05, 23-06, 24-01, 24-02	Medium, 2
		Noise disturbance of residents as nearest house/farm 50–100m from site boundary	Low, 2	X9-03, X9-04, 25-03, 25-04, 25-05, 25-08, 25-09, 37-10	Low, 2
	Gazanchi Pipe Storage Area	Disturbance to residents as a result of dust	Medium, 3	X8-04, 23-05, 23-06, 24-01, 24-02	Medium, 2
		Risk of traffic accidents if access road passes local houses	High, 6	X12-05, 6-12, 19-07, 24-02, 30-08, 30-15, 33-01, 33-15, 33-16, 37-04, 37-06, 37-09, 37-10, 37-20	Low, 5
		Noise disturbance of residents as nearest houses 50m from site,	Low, 2	X9-03, X9-04, 25-03, 25-04, 25-05, 25-08, 25-09, 37-10	Low, 2
	Gazanchi Rail Spur and Offloading	Disturbance to residents as a result of dust	Medium, 3	X8-04, 23-05, 23-06, 24-01, 24-02	Medium, 2
		Risk of traffic accidents if access road passes local houses	High, 6	X12-05, 6-12, 19-07, 24-02, 30-08, 30-15, 33-01, 33-15, 33-16, 37-04, 37-06, 37-09, 37-10, 37-20	Low, 5
		Noise disturbance of residents as nearest houses 100m from site	Low, 2	X9-03, X9-04, 25-03, 25-04, 25-05, 25-08, 25-09, 37-10	Low, 2

KP	Location	Potential Impacts	Potential Impact Significance Probability*	Mitigation	Residual Impact Significance*
	Goranboy Camp Option 3	Reduced air quality from waste incineration, in local area, if installed	Low, 2	X8-05, 7-13	Low, 1
	Kurdemir Camp Option 5	Reduced air quality from waste incineration in local area, if installed	Low, 2	X8-05, 7-13	Low, 1
	Kurdemir Rail Spur and Offloading Area	Noise disturbance of residents as nearest houses 50m from site, adjacent to proposed rail spur extension and houses on other side of railway line	Medium, 4	X9-03, X9-04, 25-03, 25-04, 25-05, 25-08, 25-09, 37-10	Medium, 3
		Disturbance to residents as a result of dust	High, 4	X8-04, 23-05, 23-06, 24-01, 24-02	Medium, 3
		Risk of traffic accidents caused by pipe being transported across the east-west highway and through a community	High, 6	X12-05, 6-12, 19-07, 30-08, 30-15, 33-01, 33-15, 33-16, 37-04, 37-06, 37-09, 37-10, 37-20	High, 5
	Kurdemir Pipe Storage Area Option 1 (Mususlu) and access road	Disturbance to residents as a result of dust	Medium, 3	X8-04, 23-05, 23-06, 24-01, 24-02	Medium, 2
		Noise disturbance of residents as nearest houses 150m from site	Medium, 4	X9-03, X9-04, 25-03, 25-04, 25-05, 25-08, 25-09, 37-10	Medium, 3
		Risk of traffic accidents caused by pipe being transported across the east-west highway and through communities	High, 6	X12-05, 6-12, 19-07, 30-08, 30-15, 33-01, 33-15, 33-16, 37-04, 37-06, 37-09, 37-10, 37-20	High, 5
	Access to/from Kurdemir Rail Spur and Offloading Area and Pipe Storage Area Option 2 (Mususlu)	Risk of traffic accidents caused by pipe being transported across the east-west highway and through communities	High, 6	X12-05, 6-12, 19-07, 30-08, 30-15, 33-01, 33-15, 33-16, 37-04, 37-06, 37-09, 37-10, 37-20	High, 5

KP	Location	Potential Impacts	Potential Impact Significance Probability*	Mitigation	Residual Impact Significance*
	Mugan Pipe Storage Area and Rail spur and Offloading area	Disturbance to residents as a result of dust	Medium, 4	X8-04, 23-05, 23-06, 24-01	Medium, 3
		Noise disturbance as nearest houses 80m from site, but houses are other side of railway line	Medium, 2	X9-03, X9-04, 25-03, 25-04, 25-05, 25-08, 25-09, 37-10	Low - Medium, 6-7
		Risk of traffic accidents if access road passes through communities	Low - Medium, 6 - 7	X12-05, 6-12, 19-07, 24-02, 30-08, 30-15, 33-01, 33-15, 33-16, 37-04, 37-06, 37-09, 37-10, 37-20	Low - Medium, 6 - 7
	Poylu Rail Spur and Offloading	Risk of traffic accidents if access road passes through communities	Medium, 4	6-12, 19-07, 24-02, 30-08, 30-15, 33-01, 33-15, 33-16, 37-04, 37-06, 37-09, 37-10, 37-20	Medium, 2
		Disturbance to residents as a result of dust	High, 4	X8-04, 23-05, 23-06, 24-01	Medium, 3
	Saloghlu Pipe storage area	Noise disturbance of shepherd's hut <50m, located on the corner of site	Medium, 4	D8-05, X9-03, X9-04, 25-03, 25-04, 25-05, 25-08, 25-09, 37-10	Low, 2
		Disturbance to shepherd as a result of dust	High, 4	X8-04, D8-05, 23-05, 23-06, 24-01, 24-02	Medium, 3
	Saloghlu Rail Spur and Offloading	Disturbance to residents as a result of dust	Medium, 3	X8-04, 23-05, 23-06, 24-01, 24-02	Medium, 2
	Saloghlu Camp	Disturbance to residents from noise from traffic on access roads to the site	Low, 2	25-03, 25-04, 25-05, 25-08	Low, 2
	Samukh, Camp Option 3	Reduced air quality from waste incineration in local area, if installed	Low, 2	X8-05, 7-13	Low, 1
		Disturbance to residents as a result of dust from construction traffic on access road to the site	Medium, 2	23.05, 23.06, 24.01	Low, 1

KP	Location	Potential Impacts	Potential Impact Significance Probability*	Mitigation	Residual Impact Significance*
		Disturbance to residents from noise from traffic on access roads to the site	Low, 2	25.03, 25-04, 25.05, 25.08	Low, 2
		Risk of traffic accidents if access road passes through communities	High, 6	X12-05, 6-12, 19-07, 24-02, 30-08, 30-15, 33-01, 33-15, 33-16, 37-04, 37-06, 37-09, 37-10, 37-20	High, 5
	Ujar Camp Option 5	Reduced air quality from waste incineration in local area, if installed	Low, 2	X8-05, 7-13	Low, 1
	Yevlakh Pipe Storage Area, Rail Spur and Offloading Areas and unpaved access road	Noise disturbance as nearest house 50m from site	Medium, 4	X9-03, X9-04, 25-03, 25-04, 25-05, 25-08, 25-09, 37-10	Low, 2
		Risk of traffic accidents if access road passes local residences	Low - Medium, 6 - 7	X9-05, 6-12, 19-07, 24-02, 30-08, 30-15, 33-01, 33-15, 33-16, 37-04, 37-06, 37-09, 37-10, 37-20	Low 6-7
		Disturbance to residents as a result of dust	High, 4	X8-04 X9-05, 23-05, 23-06, 24-01	Low, 2

* assessed using Table 3-26, the probability of each impact occurring was then evaluated on a graduated scale with 1 = Remote and 8 = Relatively Common

Table 10-25 and Table 10-26 demonstrate that community health safety, and security mitigation measures are expected to reduce impact significance across many of issues. The generic mitigation measures related to community disturbance and health impacts as a result of dust generation and noise are addressed in Sections 10.8 and 10.9 respectively. Proposed mitigation measures are summarised below.

10.12.4 Mitigation

10.12.4.1 At the design and pre-construction stages:

The impact avoidance and mitigation measures for pipeline design are discussed in Chapter 11 (Unplanned Events). Listed below are the main community mitigations for the pre-construction stage.

Pre-construction

- Where it is considered that there is a higher risk of the pipeline being damaged or interfered with, or where other services are crossed and at track and road crossings, the pipeline will be covered by concrete slabs or set in concrete (D30-01)
- Risk assessments will be carried out to identify sensitive receptors such as hospitals and clinics along Project access routes. The Project will ensure that

access to and from these facilities is not restricted by Project activities or an alternative access is in place and has been agreed with the hospital or clinic staff (31-02)

- The ROW of the SCPX pipeline and any additional temporary workspaces will be surveyed and set out (i.e. marked out and, where necessary, fenced off). The contractor will be required to keep within the designated footprint (30-23)
- The Contractor will be required to develop and implement a Grievance Procedure to provide opportunity for local residents to raise concerns (33-01)
- The livestock pens and temporary accommodation will be relocated a minimum distance of 200m from the boundary of BVR A6 (D8-04) to ensure the livestock pens and the temporary dwelling associated with them are located well outside of the safety zone and to help ensure there are no significant noise or dust impacts
- There will be a 50m buffer zone between the herder's temporary dwelling and the pipe storage boundary fence at Saloghlu Pipe Storage Area (D8-05) to help reduce temporary noise and dust impacts during the temporary occupation of the site by the SCPX Project
- At the Yevlakh Pipe Storage Area, Rail Spur and Offloading Areas, a new access road will be created away from existing houses and occupied residences (X9-05) to help reduce temporary noise and dust impacts caused by traffic to and from these temporary sites.

10.12.4.2 In the construction phase

The project will review measures to mitigate community health and safety impacts regularly and to consult PAC leaders every six months, informing them on the status of implementation and results and discussing any changes needed to the 'Pollution Prevention Plan' or the 'Community Health, Safety and Security Plan' in advance of proposed changes (33-15). Information will be disclosed to PAC leaders regarding potential community health and safety impacts and mitigations at a sufficient level of detail to help these stakeholders to fully understand current and expected risks and, as necessary, additional measures to be implemented (33-16). The following issues and mitigations in relation to community, health, safety, security and relations are discussed below.

Risk of accident to local people and livestock from the Project site, particularly from open trench

The focus on the following mitigation measures is to reduce the risk and impact associated with sections of open trench. The following mitigation measures will be adopted.

- Welded pipe sections will be capped to prevent entry (19-04)
- Warning barriers and/or signs will be erected where the pipeline route crosses locations identified by local communities as being heavily used by people, including herders (20-03)
- Local people will be actively discouraged from using the ROW as an access road (through use of signage, public education, leaflets etc.) (3-09)
- Protective barriers will be erected at excavations at a road or river crossing, close to a community or that are flooded temporarily in accordance with the Community HS&S Plan; warning barriers will be deployed around areas of lesser risk to members of the public (30-04)
- Water will be pumped from flooded excavations (e.g. with centrifugal pumps or well-points as appropriate) where a risk assessment concludes that they present a safety risk (30-09)
- If water accumulates in the open trench (either from rainfall or because of a high water table), it will be pumped out before the pipe is lowered into the trench. All trench water will be discharged safely with the aim of minimising erosion (3-34)
- 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)

- The pipe will not normally be strung on the ROW more than 15km in advance of pipeline welding (32-09)
- Land users and local communities will be consulted to determine their requirements for access across the ROW (33-19)
- Bridges will be provided across open trenches and welded pipes at locations where there is a demonstrable need for people to cross, if it is reasonable for them to do so and can be accommodated safely, taking into account works being undertaken in that area at the time (30-06)
- Warning posts and bunting will be erected to mark overhead cables and temporary crossing points (30-17)
- 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)
- Construction traffic warning signs will be positioned at road crossings and other appropriate locations as determined by the Project, for example along access routes before they are used by construction traffic (30-18)
- Community Liaison Officers (CLOs) appointed by the Contractor will participate in, or deliver safety awareness training to, local children and their parents and/or their teachers (30-08). Particular emphasis will be placed on talking to children and explaining the dangers of construction sites and open trench.

Risk of accident to local people and livestock particularly from traffic

This section addresses Project-related road traffic injuries and accidents. The current road condition is assessed as poor, which increases the risk of transport-related accidents, particularly in extreme weather conditions. The following general mitigation measures will be adopted to minimise risk:

- Vehicle movements will be restricted to defined access routes and demarcated working areas (unless in the event of an emergency) (2-02) - the contractor will be expected to use the designated access roads and to apply for Project Company consent to use any new or existing roads not designated for Project use (30-24)
- A strict Project speed limit of 30km/hr will be enforced for Project vehicles using unmade tracks and the ROW (24-02)
- Night-time driving will be by exception only, as approved by the Company to minimise driving risk and disturbance to communities (37-10)
- Temporary traffic control (e.g. flagmen) and signs will be provided where necessary to improve safety and provide directions (37-03)
- Temporary traffic control measures will be employed at road crossings and junctions (flagmen, temporary traffic lights) where a safety risk assessment has identified traffic control measures will reduce the risk of traffic accidents (37-04)
- Where traffic is diverted around crossings, traffic control or careful selection of the exit from the working areas will be provided with the aim of ensuring that vehicles join the road in a safe manner (30-21). The authorities will be notified when oversize heavy loads need to be transported and the loads will be escorted by the Project (37-05)
- At sensitive locations where Project construction traffic will be using local roads, and particularly where schools and markets are close to the road, awareness of safety issues will be raised through village meetings and classroom lessons (30-02)
- All contractors and subcontractors will adhere to BP driving rules (37-09). All drivers will undergo safety and environmental and social awareness training; driving

performance will be assessed and monitored with additional training provided if necessary (19-07)

- Local people will be actively discouraged from using the ROW as an access road (through use of signage, public education, leaflets, etc.) (3-09)
- At locations where schools are very close to a road used by SCPX traffic, the construction contractor will plan works to minimise the delivery of heavy loads at times when children are likely to be walking to and from school (37-06). Construction traffic warning signs will be positioned at road crossings and other appropriate locations as determined by the Project, for example along access routes before they are used by construction traffic (30-18)
- The selection of any further access roads (in addition to those used during BTC/SCP construction) to Project working areas will aim to avoid sensitive receptors such as centres of communities, hospitals, clinics and schools as far as practicable (30-22)
- The ROW of the SCPX pipeline and any additional temporary workspaces will be surveyed and set out (i.e. marked out and, where necessary, fenced off). The contractor will be required to keep within the designated footprint (30-23).

On the roads to and from Kurdemir Pipe Storage Area Option 1 and 2 (Mususlu) and Mugan, Yevlakh and Poylu Pipe Storage Area, Ujar and Kurdemir camps, Gazanchi rail spur, offloading and pipe storage areas traffic management measures will be developed and implemented with the aim of minimising impact to communities (X12-05).

General community relations and the risk of conflict and crime between community members, foreign construction workers and security personnel

In reducing the number of potential impacts, liaison and communication with the community will be important. The following mitigation measures are proposed to minimise the likely potential impacts:

- At a strategic level, the Project will implement the 'Voluntary Principles on Security and Human Rights' (30-10). During construction (and operations), due diligence will be applied to selection of security providers, rules of engagement will be devised, and training provided to all personnel. Performance will be monitored and audited periodically (30-12)
- Random drug and alcohol testing of the workforce will be conducted, recorded and audited regularly (30-15)
- The Project will seek to manage employment expectations by explaining the number and type of opportunities in advance to local communities via the Community Liaison Officers (28-05)
- The Employee Code of Conduct will prohibit the workforce from participating in illegal activities, including use of illegal drugs, bribery and corruption or requesting or receiving gifts from communities (33-06).

Potential for spills or leaks to impact PACs

There is the potential risk of exposure by the community and workers to a number of hazardous materials including air pollution related to industrial activity such as incineration, any Project-related solvents, paints, oils, fuel, cleaning agents via leaks and spills. Mitigations measures related to dust are discussed in Section 10.8. The following mitigation measures are given to address the remaining exposure risk:

- Spill response equipment (absorbents etc.) will be available in hazardous materials storage areas (6-10)
- Relevant construction personnel will be trained in use of spill kits and disposal practices (6-11)

- A trained rapid response team will be mobilised in the event of spillage of hazardous materials (6-12)
- Vehicles delivering fuel or hazardous liquids will carry appropriate spill kits to allow an initial response to any spill to be deployed (6-20)
- The project will apply a risk assessment approach to contaminated land management to evaluate the potential impact of soil, surface water or groundwater contamination on local receptors (31-04)
- Medical waste will be disposed of via a medical contractor or a Company approved incinerator (31-06)
- The storage of hazardous materials will be restricted to designated impermeable hazardous materials storage areas located at least 50m from any surface watercourse or seasonal water channel (6-03).

Water discharge
The following mitigation measures will be implemented to prevent potential impacts to surface and groundwater:

- A risk assessment will be undertaken before any chemical additives are used in hydrotest water (10-08)
- The direct discharge of hydrotest water to watercourses and soakaways will be subject to the results of the chemical risk assessment. The use of evaporation basins will be considered subject to the availability of land and an environmental and social assessment (10-21)
- Waste water will be reduced by efficient use of raw water and the implementation of water management schemes that require water to be reused, whenever practicable, prior to treatment and disposal (14-03), which will also contribute to the reduction of potential impacts. Other mitigations including the discharge of wastewater in accordance with Project standards (14-06) and the monitoring of wastewater discharges will contribute to the reduction of potential impacts and have therefore been considered in the assessment of post-mitigation impacts.

Air emissions
Emissions from camps, pigging stations and block valves have been considered. The likely impacts will be during the construction phase of the Project. During operation, minimal emissions will occur from the permanent facilities. Mitigations for dust generation and concentrations in the air are discussed in Section 10.8.4.

Sanitation and waste
The prevalence of food-borne and gastrointestinal infection as well as infectious parasites is a likely risk. Waste management practices will be subject to regular monitoring and auditing (7-04) and the measures described in 'Transmission of food-related illnesses' below will be implemented to help control these risks.

Risk of death or deterioration of patient's condition as a result of delays in reaching a medical facility
As discussed previously, risk assessments will be carried out to identify sensitive receptors and the Project will ensure that access is either not restricted or an alternative access is in place and has been agreed. SCPX-related drivers will be briefed so they understand the importance of ensuring free access and egress of ambulances to the hospital and all traffic to clinics (31-03). This mitigation measure is to be adopted before works begin to minimise the likelihood of the risk occurring.

Non-communicable diseases (NCDs)
The Project is likely to employ a number of local workers during construction. It has been observed in certain types of working environments that workers often experience significant

changes in weight, i.e. rapid weight gains. Negative changes in exercise and dietary habits are associated with increases in NCDs, particularly diabetes and cardiovascular diseases. The following mitigation measures will be implemented:

- A non-communicable disease (NCD) awareness programme will be implemented (31-10). Pre-job fitness for task assessments will be implemented and will be repeated at regular intervals based on the employee risk profile (31-11). This may also identify employees at risk of or suffering from NCDs
- Worker education and awareness programmes will be conducted and materials regarding the health hazards of smoking, alcohol and substance abuse will be provided (31-13).

Social determinants of health
Increased drug and alcohol abuse leads to 'social determinants of health' (SDH) changes. Impacts are typically associated with employment and income and include substance abuse, depression, violence and community cohesion. These changes often trigger behavioural changes and have the potential to result in indirect and cumulative impacts (but these are mediated by personal behaviour choices). There is the potential for local concerns associated with recruiting local contractors/workers from regions away from the Project. Mitigation measures to minimise employment-related concerns are discussed in Section 10.14.4.

There is the potential for tensions to arise resulting from cultural differences, anti-social behaviour of construction workforce, potential prostitution and attraction of 'hangers on' at campsites. Mitigation measures to be adopted to reduce the potential impacts of SDH changes include:

- Project will prohibit the workforce from participating in illegal activities including use of illegal drugs (31-12)
- Worker education and awareness programmes will be conducted and materials regarding the health hazards of smoking, alcohol and substance abuse will be provided (31-13)
- The Employee Code of Conduct will prohibit the workforce from participating in illegal activities, including use of illegal drugs, bribery and corruption or requesting or receiving gifts from communities (33-06)
- A Company policy limiting alcohol consumption in construction camps will be applied (33-08).

Communicable diseases including sexually transmitted diseases (STIs)
Incoming workers are a potential 'vector of spread' for STIs and other communicable diseases owing to the potential for interaction with local people.

Mitigation measures to be adopted to reduce the potential impacts of communicable diseases are:

- A risk assessment will be undertaken when considering waste water discharge options and locations (31-05)
- A worker education and awareness programme regarding the risks and prevention measures associated with STIs including HIV/AIDS and other communicable diseases (e.g. tuberculosis) will be implemented (31-14)
- The project will make information on communicable diseases and STIs available to communities close to the camps (31-15).

Housing and respiratory issues
To prevent rapid rise and transmission (worksites and community) of respiratory disease, primary and secondary prevention strategies are being adopted. Mitigation measures to minimise housing and respiratory issues include:

- Temporary Project housing structures will be constructed and maintained according to internationally accepted design specifications for space occupancy per person (31-16)
- The Contractor will operate a personnel health programme which will aim to prevent illness and disease occurring, and will include immunisations as required (31-17)
- A workplace tuberculosis control programme will be implemented (31-18).

Transmission of food-related illnesses
The three main issues relating to Project impacts on food and nutrition are transmission of food-related illness to the surrounding community or from community to project workers, food price inflation and the effect on vulnerable groups. Mitigation measures to reduce the effects of health through poor handling of food include:

- A food sanitation programme will be developed and implemented within all Project catering facilities based on internationally recognised standards (31-19)
- Food-borne illness investigation procedure will be implemented and workers will be educated regarding the prevention of food-related illnesses (e.g. hygiene practices) (31-20)
- Food service operations, practices and facilities will be regularly inspected and findings and resolved non-compliance issues will be documented immediately (31-21).

Zoonotic diseases
Zoonotic diseases can be transmitted from animals to people and the risk of infection is present for both the community and workforce. Measures for preventing zoonotic disease transmission will be implemented (31-22). These measures are likely to include keeping animals (pets, livestock, etc.) outside of construction camp fence lines, implementing rodent control programmes, storing waste appropriately and in a secure manner at the construction camps and prohibiting feeding of wildlife. The Company will carry out a due diligence exercise to identify and manage the risk of anthrax (6-22). If any animal burial pits are identified during construction, works will cease in this location until the affected area has been subject to sampling by qualified personnel to determine if there is a risk of anthrax (6-25).

Vector-related diseases (VRDs)
A vector-related disease (VRD) prevention programme will be implemented (31-23). This may include the use of rodent control programmes at the construction camps and the provision of suitable PPE to reduce the risk of insect bites. Construction contractors will be required to manage the storage and disposal of food and organic wastes to avoid attracting vermin (19-08).

10.12.4.3 Site-specific mitigation

Shusha village at KP59 has been identified as a sensitive location owing to the potential for vibration-related impacts. Specific mitigation measures are given below:

- Vibration sensitive locations will be determined by the Contractor and listed in their Pollution Prevention Implementation Plan, together with details for monitoring vibration before and during movement of heavy equipment. Further actions will depend on the outcome of vibration monitoring (25-13)

- A survey record will be undertaken to record the external condition of buildings in close proximity to the ROW or access roads prior to construction; this will provide baseline evidence in the event of claims for damage (25-14).

Chiyny, Garaberk, Alpout and Dallar Dashbulak villages, and a house at KP62.2, have the potential for dust at locations where the proposed SCPX route passes in close proximity to dwellings. Both generic and site-specific mitigation measures for dust generation and concentrations in the air are discussed in Section 10.8.4.

A number of site-specific potential impacts arising from the construction and operation of the proposed SCPX Project are addressed by both generic and specific mitigation measures. These are discussed in Sections 10.3, 10.4, 10.5, 10.8, 10.9, 10.14 and 10.15.

Mitigation measures for traffic accidents at all temporary facility areas are discussed in Section 10.12.4.2.

10.12.4.4 In the operations phase

During operations, many of the mitigation measures listed for construction stage in other sections of this chapter will still be applicable, for example, BP driving standards and training, reduced speed on the ROW and any access tracks. An Emergency Response Plan will be in place prior to operation and is discussed further in Chapter 12.

The operational controls listed in Chapter 12 will contribute to community safety during the operational phase of the SCPX Project.

10.12.5 Residual Impacts

The residual impacts associated with the risk of traffic-related accidents to surrounding communities generally remains high after mitigation, mainly because of the condition of the road, weather conditions and the volume of traffic generated by the Project. The Project health and safety representatives will plan and coordinate transport and emergency response protocols to further reduce the level of risk of death or deterioration of patient's condition as a result of delays in reaching a medical facility to further reduce the residual medium significance rating. Outbreaks of infection in camps, which could be transferred to PACs, still remain a residual risk of medium significance because local workers still have the likely potential to transfer communicable diseases to family members. The increase in prevalence of STIs in camp and PACs can be difficult to control despite mitigation measures in place and as such is rated as medium after mitigation. The residual risk of conflict between the community members and workers after mitigation is low.

The potential community health vibration impact to buildings in Shusha village will be reduced to low significance.

Despite the mitigation measures discussed, some sensitive areas along the route and houses close to most of the rail spur and offloading areas will retain a temporary medium residual impact owing to dust impacts during construction, as discussed in Section 10.8.5.

Community safety and liaison plans will be developed and KPIs will be monitored by the Project to track and effectively manage and mitigate any potential impacts and new risks as they arise. In general, effective implementation of the proposed mitigation measures is likely to reduce the significance of other impacts (zoonotic and non-communicable diseases) on community health and safety to low levels and decrease the probability that such events occur.

There is a potential beneficial impact which is the improved health of population employed or dependent on people employed by the Project as a result of disease awareness and disease reduction programmes put in place by the Project.

10.13 Land

This section covers potential impacts on land, including land ownership, land use and land-related livelihoods, during construction and operation of the SCPX Project, as well as associated impact minimisation, avoidance and compensation measures. This section provides a summary of the impact identification and assessment, and further details will be provided in the specific land acquisition planning document developed for SCPX (the 'Land Acquisition and Compensation Framework', LACF) and its summary intended for broad distribution to landowners and users (the 'Guide to Land Acquisition and Compensation', GLAC). Therefore, this section must be read in conjunction with the LACF. In the event of any discrepancy between this section and the LACF, the language in the LACF takes precedence. The purpose of the LACF is to assess the potential impacts of land acquisition and inform the GLAC and the ESIA and ESMMP (in particular the Land Management Plan). The LACF has been managed as a parallel process with the ESIA and compiled by an internationally recognised expert.

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

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

1. The construction, commissioning and operation of a new 56-inch (1422mm) diameter looped pipeline starting at SCP KP57 (SCPX KP0) at the tie-in facility between the towns of Hajigabul and Mugan and continuing to the border with Georgia (SCPX KP389) and beyond into Georgia. The pipeline is routed parallel to the existing SCP and BTC pipelines for most of its length
2. Construction, commissioning and operation of permanent facilities, including:
    - Tie in and pigging station between Hajigabul and Mugan
    - Five block valves
3. Development and use during construction of temporary facilities such as construction camps, pipe storage, rail off-load, temporary access roads and extra width at certain crossings.

These three 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 defined by Azerbaijan law and good industry practice. In practice, these restrictions include the 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. In summary, the pipeline corridor (1) is leased from its owners during construction and (2) handed back these land owners after construction and reinstatement to its pre-project condition with minor restrictions that do not impede its normal agricultural use
- Land designated for construction and operation of permanent facilities will be acquired on a permanent basis from its current owners
- Land where temporary facilities needed for the construction period are located will be leased from its current owners for the duration of construction (typically three

years). Where such land was used for agriculture, it will be reinstated such that normal agricultural re-use can resume (typically without any restrictions). However, experience of BTC/SCP construction indicates that, particularly where the landowner is a municipal administration, they may express interest in being handed back the land without reinstatement, as some of the infrastructure (drainage, concrete basements) may be of interest to them for future re-use. The base case, however, is that all land used on a temporary basis will be reinstated to its pre-project condition.

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 10.12.
- 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, and in addition to restrictions upon land discussed previously, 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/usage actions are presented in the LACF and the associated GLAC.

10.13.2 Key Sensitivities

The review of land use data in the footprint of Project facilities and the socio-economic surveys undertaken over a sample of Project-affected people (see Chapter 3) indicate that key sensitivities are associated with the following situations:

- Potential displacement of three livestock pens and temporary accommodation at block valve A6 at SCPX KP21
- The potential relocation of a farm, including a residential house, at SCPX KP289 in Shamkir District
- Project temporary facilities to be located on land that is used for agriculture or other economic activities:
    - At Mugan Pipe Storage Area, Rail Spur and Offloading Area the rail spurs are used occasionally by other users and the area is crossed by graziers who also house a few cows in a structure that will be left in place
    - Graziers and use of the pipe storage and camp area at Saloghlu and Kurdemir Camp Option 5
    - Part or all of the Kurdemir Pipe Storage Area (Mususlu) Option 2, Goranboy Camp Option 3 and the new temporary access road to Kurdemir Camp Option 5 are being used for agriculture
    - The Dallar Rail Spur is used for fruit export and the Dallar Pipe Storage Area is partly used by an existing gravel extraction business
    - The Poylu rail spur and part of off-loading site is used to store gypsum
    - In such situations, any users, whether formal or informal, will be identified and the Projects' compensation procedures for temporary occupation of land and associated loss of livelihood will be applied.

- Livestock pens near BVR A6, which are lived in by the herder for part of the year, which are within the safety zone
- Although temporary, the disruption to farming in the construction corridor may be significant, particularly in areas to the west of the route where intensive farming of high value crops is widespread. This is particularly the case in the villages of Garaberk and Alpout, where a number of orchards and gardens are affected. Livelihoods of farmers will be affected and have to be compensated
- People whose livelihoods are dependent upon grazing herds may experience limited disruption during construction, particularly with regards to severance of usual grazing and watering itineraries due to the barrier effect of the pipeline trench and construction corridor. This is deemed more sensitive in the eastern part of the route (Shirvan plain and Gobustan desert), where more livestock is bred than in the western part.

10.13.3 Impacts on Landowners and Users

10.13.3.1 Design

Avoidance of physical displacement of people is a key criterion of project design, including permanent facility siting and pipeline routing. However, there is one location where this may be unavoidable and a farm, including a permanent residence, may have to be relocated. Temporary residence(s) established in the vicinity of a proposed block valve will also have to be relocated due to safety concerns. This is discussed further below.

10.13.3.2 Proposed pipeline construction and commissioning

Based on the number of landowners affected by the BTC/SCP construction in Azerbaijan it is tentatively estimated that about 4500 discrete plots of land[14] could be affected by the SCPX pipeline in Azerbaijan, for a likely total of about 1000 landowners (many landowners own contiguous plots with distinct cadastral identification). The total footprint of the SCPX pipeline construction corridor is currently estimated to be in the order of 1,390 hectares.

Actual pipeline construction activities will not last more than a few months in a given location. However, taking into consideration the time needed for reinstatement and the construction schedule, land in the pipeline construction corridor will be leased for three years by SCP Co. from its current owners.

In addition to impacts within the designated and compensated corridor, pipeline construction may cause disruption, severance and damage to neighbouring, uncompensated pieces of land, in the following situations:

- Interruption of irrigation or drainage affecting crops in uncompensated plots
- Severance of access to cultivated plots during construction, impeding farmers' access to a plot and resulting in total or partial loss of crop
- Loss of agricultural productivity of the land during the Project construction period and the reinstatement period can be both a primary and secondary impact
- Accidents to livestock as a result of Project activities resulting in livelihood loss
- Reduced fruit and vegetable production from loss of available cultivated area resulting in loss to livelihoods
- Damages to crops in plots neighbouring the pipeline construction corridor due to, for example, spill over of earth or intrusion of equipment.

Potential secondary impacts on productivity or crops arise from:

[14] That is, land parcels with separate cadastral identification, which does not mean that they are separate from a functional point of view.

- Increase in soil erosion, damage to soil properties and soil compaction which may affect the productivity of the land
- Accidental contamination during construction by spills or leaks
- Loss of timber being grown for its products, e.g. fuel or fruit
- Impacts resulting from diversion or lowering of groundwater including access to water by livestock
- Reduced production from beehives or crops such as fruit and vegetables as a result of increased dust generated from Project activities, which results in a loss of income.

The pipeline corridor affects specific locations identified as of higher sensitivity from a land use perspective:

- In the village of Dallyar Dashbulak in Shamkir District, a farm at KP289, including a residential house and three to four ancillary buildings, is potentially affected physically by the proposed Project. This may affect approximately 23 individuals, 5 of whom reside in the physically affected residential structure and would therefore be physically displaced, with the other 18 using the buildings for agricultural and livestock breeding purposes and potentially economically affected. Alternative routing was identified at the time of publishing this updated Final ESIA, and options are being considered at this location. The number of physical constraints, including, but not limited to the presence of other pipelines and impact from a new proposed highway are currently being considered. Route optimisation is ongoing to seek a solution that would avoid this impact
- In the villages of Garaberk and Alpout, a number of orchards and gardens are affected.

10.13.3.3 Pigging station

This facility (KP0) is located on municipal, unused land. This land will be permanently acquired and associated compensation at replacement value will be paid to the relevant municipal authority. There is no impact to any identified land use. There may be some disruption to movement of herds in the area. This has been assessed as a possibility given the common use of similar land (on the lower slopes of the desertic hills of Gobustan) for grazing in winter, but is yet to be ascertained in the particular case of this facility.

10.13.3.4 Block valves

Five block valve sites (BVRs) are proposed with temporary construction footprint of about 1000m^2. A smaller footprint of approximately 875m^2 each will be acquired permanently and compensation at replacement value will be paid to each affected landowner. No residual impacts on livelihoods are anticipated given the small size of the block valves and the fact that none is located on high-value farming land. These new SCPX block valves are co-located with existing SCP block valves to avoid the need for another access road, thereby minimising the footprint and impacts.

At the block valve at SCPX KP21, there will be relocation of livestock pens and an accommodation building that are located in the safety zone and vent area for the new block valve.

10.13.3.5 Proposed temporary construction-related facilities

Whilst most sites have been selected to have no or little impact on land use, as they either comprise unused municipal land or are existing or disused rail sidings that will be brought into use for the Project), three temporary construction-related facilities have tentatively been identified as having potential impacts on land use, as mentioned in Section 10.13.2.

Landowners (where the facility is not located on municipal land) and/or land users (where the facility is located on either municipal or private land) will be identified and compensated as per detailed compensation provisions presented in the LACF.

Other temporary construction-related facilities affect unused municipal land.

On the access road associated with the Kurdemir Rail Spur and Offloading Area and Kurdemir Pipe Storage Areas Options 1 and 2 (Mususlu) and Poylu Pipe Storage Area existing irrigation/drainage canals may need to be culverted with the potential to impact on flows available to other users.

10.13.3.6 Pipeline operation

Pipeline operation will result in the following potential impacts:

- Minor restrictions to agricultural re-use (no deep ploughing, no plantation of trees with deep roots within an 8m-wide strip)
- Restrictions to building in the 8m and 30m strips, as well as in the vicinity of block valves and their vent areas
- Potential damage to crops where access is needed to the pipeline corridor for maintenance or urgent intervention purposes.

10.13.3.7 Impact summary and assessment of significance

Table 10-27 provides an assessment of the likely significance of impacts on land acquisition on land-based livelihoods before and after implementation of the proposed mitigation measures that are discussed in the following section.

Table 10-28 shows potential impacts on sensitive land users in the vicinity of the proposed SCPX works.

Table 10-27: Potential Generic Impacts of Land Acquisition

Issue		Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
A2	Soil compaction	Loss of agricultural productivity	C-3 Medium	2-01, 2-02, 2-03, 2-04, 2-05, 2-07, 3-09, 3-15, 4-06, 17-16, 33-13, OP61, LACF18, LACF21	C-1 Low
A3	Soil erosion and sediment run-off following removal of vegetation and/or disturbance of ground	Loss of agricultural productivity	C-3 Medium	3-03, 3-08, 3-15, 3-32, 4-09, 4-12, 33-13	C-1 Low
A4	Loss of soil structure, fertility and seed bank	Loss of agricultural productivity	C-3 Medium	4-02, 4-03, 4-04, 4-09, 4-15, 4-22, 33-13, LACF18, LACF21	C-1 Low
A13	Flooding caused by impeded river or ground surface flows	Loss of agricultural productivity	C-3 Medium	13-01, 13-02 13-03, 13-05, 33-13	C-1 Low

Issue		Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
A20	Impeded movement of wild animals, domestic herds and people due to open trench, pipe string or spoil storage mounds	Disruption of movement of herds	B-2 Low	20-01, 32-08, 33-19	B-1 Low
A21	Open excavations (including open trench)	Accidents to livestock resulting in livelihood loss	C-2 Low	21-01, 21-02, 33-13	C-1 Low
A24	Dust generation, particularly from vehicle movements, storage of excavated materials and operation of concrete batching plant	Less honey production, and livelihood loss	C-2 Low	4-09, 23-05, 23-06, 24-01, 24-02, 24-05, 24-06, 33-13, LACF02, LACF06	C-1 Low
		Reduced fruit and vegetable production and resulting loss to livelihoods	B-2 Low		B-1 Low
A32	Permanent or temporary loss/severance of agricultural land or property	Pipeline corridor: the inability to use land for agriculture during construction and during the reinstatement period after construction	D-4 High	16-01, 17-14, 32-01, 32-04, 32-05, 32-07, 32-17, 36-03, 33-13, OP25, OP133, LACF18, LACF19, LACF22, LACF50, LACF51	D-2 Low
		Potential secondary impacts on productivity arising from soil damage, accidental contamination, loss of timber, access to water and impacts of dust, e.g. on bees	D-4 High	16-01, 32-04, 32-07, 32-17, 36-03, 33-13, LACF18, LACF19, LACF22, LACF50, LACF51	D-2 Low
		Temporary construction-related facilities: The inability to use land for agriculture during construction and during the reinstatement period post construction	C-3 Medium	16-01,17-14, 32-01, 32-04, 32-05, 32-17, 33-19, 36-03, 33-13, LACF20, LACF21, LACF22	C-2 Low
		Severance of access to cultivated plots during construction, impeding farmers' access to a plot and resulting in total or partial loss of crop	C-3 Medium	33-19, 33-13, LACF09, LACF23, LACF24	C-2 Low

Issue		Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
		Damages to crops in plots neighbouring the pipeline construction corridor, due to, for example, spill over of earth or intrusion of equipment	C-3 Medium	2-02, 32-03, 33-13, 39-02, 39-03, LACF03, LACF06	C-2 Low
A34	Loss of field boundaries	Impediment to agricultural use of land	C-3 Medium	3-19, 17-14, 32-07, 33-19, 33-13, 34-01, LACF02, LACF07, LACF50, LACF51	C-2 Low
		Accidents to livestock resulting in livelihood loss	B-2 Low		B1-Low
A36	Disruption of irrigation/drainage infrastructure	Temporary disruption of irrigation or drainage causing loss of agricultural production	C-2 Low	16-01, 33-19, 35-05, 35-06, 35-07, 35-08, 36-03, LACF02, LACF06, LACF09, LACF12, LACF18, LACF50	C1-Low

*Assessed using Tables 3-22 and 3-23 and an estimate of impact significance factors before and after mitigation

Table 10-28: Potential Impacts on Land Users at Specific Locations

Location	Issue	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
KP0 – Pigging station	Herders (actual presence to be confirmed)	Potential disruption to grazing and movement of herds, land acquisition of dry pasture land	B-2 Low	32-01, 32-17, 33-19, 34-01, LACF55, LACF56	B-1 Low
Block valve A6 KP21	3 livestock pens and 1 temporary accommodation are located within pipeline corridor and safety zone	Physical displacement of house; movement of livestock pen(s)	D-4 High	D8-04, X13-08, X13-09, 32-01, 33-13, 33-19, LACF02, LACF03, LACF33, LACF55, LACF56	D-3 Medium
KP21, 95, 172, 243, 334	None identified	Block valve: permanent land acquisition of approximately 875m^2 - potential impact to landowners from loss of land and any related loss of livelihood	B-2 Low	16-01,17-14, 32-01, 32-04, 32-05, 32-07, 32-17, 33-19, 34-01, 35-05, 35-06, 35-07, 35-08, 36-03, 39-04, LACF16	B-1 Low
KP96–102;KP139–146	Agricultural users of water in irrigation channels/agricultural land dependent on drainage channels	Temporary loss of water supply/temporary impact on flow in drainage channels during construction of open-cut crossings	C3 Medium	35-05, 35-06, 35-07, 35-08, 36-03, LACF06	C1 Low

Location	Issue	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
KP118	Garden owners and users	ROW intersects 10–15 gardens in Garaberk village	D-4 High	X13-06, 2-02, 4-09, 33-13, 33-19, OP25, OP133. Also A24 and A25 commitments, LACF02, LACF05, LACF06	D-2 Medium
KP123	Garden and orchards owners and users	Loss of livelihood (orchards) - ROW intersects 6-8 gardens and orchards in Alpout village	D-3 Medium	X13-07, 2-02, 4-09, 33-13, 33-19, OP25, OP133. Also A24 and A25 commitments. LACF02, LACF05, LACF06	D-2 Medium
KP289	One house and three to four ancillary structures used as livestock pens are located within the pipeline corridor in Dallyar Dashbulak village	Physical displacement of house; movement of livestock pen(s)	D-4 High	X13-08, X13-09, 32-01, 33-13, 33-19, LACF02, LACF03, LACF33, LACF55, LACF56	D-3 Medium
Agstafa Camp Option 3	Temporary land acquisition and use of agricultural private land	Potential disruption of livelihood and crop rotation	C-3 Medium	17-05, 32-01, 32-07, 32-17, 33-19, LACF55, LACF56	C-1 Low
Dallar Rail Spur and Offloading Area	Temporary land acquisition and use of used state land	Temporary occupation of state land	B-2 Low	17-05, 33-19, 35-09, LACF02, LACF36	B-1 Low
	Temporary land acquisition and use of used state land	Potential disruption of gravel plant operations	B-2 Low		B-1 Low
Dallar Pipe Storage Area	Temporary land acquisition and use of unused state land	Temporary occupation of state land	B-2 Low	17-05, 33-19, 35-09, LACF02, LACF36	B-1 Low
	Temporary land acquisition and use of used state land	Potential disruption of gravel plant operations	C-3 Medium	17-05, 33-19, 35-09, LACF02, LACF36	C-1 Low
Dallar Pipe Storage Area Option 1B (Bayramli)	Temporary land acquisition and use of privately owned pasture land	Temporary loss of grazing	B-2 Low	32-01, 32-17, 33-19, 34-01, LACF55, LACF56	B-1 Low

Location	Issue	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
Gazanchi Rail Spur and Offloading Area	Temporary land acquisition and use of disused rail siding on state land	Temporary occupation of state land	B-2 Low	32-01, 32-17, 33-19, 35-09, LACF02, LACF36	B-1 Low
Gazanchi Pipe Storage Area Option A	Temporary land acquisition and use of used and unused municipal land	Temporary occupation of municipal land. Disruption to grazing and agricultural use	B-2 Low	17-05, 33-19, 35-09, LACF02, LACF36	B-1 Low
Gazanchi Pipe Storage Area Option B	Temporary land acquisition and use of unused municipal land	Temporary occupation of unused municipal land	A-1 Low	32-01, 32-17, 33-19, 35-09, LACF02, LACF36	A-1 Low
Goranboy Camp Option 3	Temporary land acquisition and use of currently unused private land	Potential impacts on any future agricultural use. Potential disruption of herd movements	C-3 Medium	17-05, 32.01, 32-17, 33-19, LACF56, LACF56	C-1 Low
Yevlakh Pipe Storage	Temporary land acquisition and use of unused municipal land	Potential disruption of herd movements	A-1 Low	17-05, 32-17, 33-19, 35-09, LACF55, LACF56	A-1 Low
Kurdemir Rail Spur and Pipe Offloading Area	Temporary land acquisition and use of unused rail siding and area on state land	Temporary occupation of state land	B-2 Low	32-01, 32-17, 33-19, 35-09, LACF02, LACF36	B-1 Low
Kurdemir Pipe Storage Area Option 1 (Mususlu)	Temporary land acquisition and use of unused state land	Potential disruption of herd movements	A-1 Low	17-05, 32-17, 33-19, 35-09, LACF55, LACF56	A-1 Low
Kurdemir Pipe Storage Area Option 2 (Mususlu)	Temporary land acquisition and use of used state land	Temporary loss of grazing and agricultural activity during construction.	B-2 Low	32-01, 32-17, 33-19, 35-09, LACF02, LACF36	B-1 Low
Kurdemir Camp Option 5 including new access road	Temporary land acquisition and use of used municipal land	Loss of agricultural activity during construction. Potential disruption of access to irrigation canals. Potential disruption of herd movements	C-3 Medium	16-01, 17-05, 32-01, 32-17, 33-19, 35-07, 35-08, 35-09, LACF02, LACF06, LACF36, LACF02, LACF55, LACF56	C-1 Low
Mugan Rail Spur, Offloading and Pipe Storage Area	Temporary land acquisition and use of used state land	Temporary occupation of used state land	A-1 Low	17-05, 33-19, 35-09, LACF02, LACF36	A-1 Low

Location	Issue	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
Poylu Rail Spur and Offloading Area	Temporary land acquisition and use of existing rail siding on state land and offloading area on municipal land	Temporary occupation of state and municipal land. Potential disruption of existing gypsum storage operation	C-3 Medium	17-05, 33-19, 35-09, LACF02, LACF36	C-1 Low
Poylu Pipe Storage Area	Temporary land acquisition and use of private land	Potential impacts on any future agricultural use. Potential disruption of herd movements	C-3 Medium	17-05, 32.01, 32-17, 33-19, LACF55, LACF56	C-1 Low
Saloghlu Rail Spur and Offloading Area	Temporary land acquisition and use of used state land	Temporary occupation of state land. Potential disruption to existing users	B-2 Low	17-05, 33-19, 35-09, LACF02, LACF36	B-1 Low
Saloghlu Camp	Temporary land acquisition and use of used state land	Disruption of grazing and herd movements	B-2 Low	17-05, 33-19, 35-09, LACF02, LACF36	B-1 Low
Saloghlu Pipe Storage Area	Temporary land acquisition and use of used state land	Disruption of grazing and herd movements	A-1 Low	17-05, 32-17, 33-19, 35-09, LACF02, LACF36	A-1 Low
Samukh Camp Option 3	Temporary land acquisition and use of used state land	Loss of agricultural activity during construction. Potential disruption of herd movements	C-3 Medium	16-01, 17-05, 32-01, 32-17, 33-19, 35-09, LACF02, LACF06, LACF36, LACF02, LACF55, LACF56	C-1 Low
Ujar Camp Option 5	Temporary land acquisition and use of currently unused municipal land	Potential impacts on any future agricultural use. Potential disruption of access to irrigation. Potential disruption of herd movements	C-3 Medium	16-01, 17-05, 32-01, 32-07, 32-17, 33-19, 35-07, 35-08, 35-09, LACF02, LACF06, LACF36, LACF02, LACF55, LACF56	C-1 Low
Yevlakh Pipe Storage Area and Yevlakh Rail Spur and Offloading Area	Temporary land acquisition and use of used state and municipal land	Disruption of grazing and herd movements	B-2 Low	17-05, 33-19, 35-09, LACF02, LACF36	B-1 Low

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):

- Land acquisition for SCPX shall be carried out in compliance with Azerbaijan law and will be guided by international requirements (IFC PS 5) (*LACF01*)
- Impacts on both land use and livelihoods shall be compensated (*LACF02*)
- 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)*
- Land required on a temporary basis includes the pipeline Construction Corridor and land required for construction related temporary facilities such as construction camps, pipe storage yards or rail spur and offloading areas
    - 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 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*)
    - Land required for construction related temporary facilities such as construction camps or pipe storage yards will be leased from its current owners and handed back to these owners after end of construction and reinstatement (*LACF08*)
- 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*)
- Land Acquisition 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 will be able to resort to compulsory acquisition for State needs, according to the process described in the 2010 law on Land Acquisition for State Needs, under the control of the competent courts of law. 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 not purchase land required temporarily for construction related facilities but will enter into negotiated rental agreements with current landowners for the three year maximal duration of construction (LACF20)
- SCP Co. will reinstate land required temporarily for construction related facilities at the end of construction to its previous condition. Where such land is agricultural, reinstatement will seek to restore pre-construction agricultural productivity within a period of three years after the end of construction (LACF21)
- Compensation 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, for agricultural land only: 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 (*LACF22*)
- SCP Co. will be able to access Zone 1 and Zone 2 land at any time for surveillance and maintenance of the pipeline and any damage that may occur in respect of such access shall be compensated to land users (LACF23)
- 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 Construction phase: pipeline corridor

Affected landowners will be compensated for the period of occupation of the land. Land will be reinstated to near original conditions. The compensation formula will consider the loss of productivity for three years subsequent to completion of construction and reinstatement, which BTC/SCP experience indicates is sufficient.

The pipeline corridor will affect both municipal and private land. Where private land is affected, landowners will receive compensation in respect of temporary occupation but if a different individual uses the land for farming, this individual will receive any compensation due in respect of standing crops and loss of the ability to farm. The same will apply to municipal land: the relevant municipal authority will receive compensation in respect of temporary occupation but where formal or informal users are identified these will receive compensation for standing crops and loss of the ability to farm.

Compensation will be negotiated with each affected landowner and land user, based on typical rates established for common categories of land in every homogeneous area. The Project will seek to reach negotiated settlements wherever possible. Compulsory acquisition processes provided by Azerbaijan legislation will be used only in situations where it is not possible to reach a reasonable negotiated settlement (such as situations where landowners cannot be identified, are absent, or refuse any reasonable settlement proposed by the Project).

Many of the mitigation measures associated with secondary impacts are discussed in other sections of this chapter. The focus of the following mitigation measures is to reduce the level of impact associated with the Project.

Accidents to livestock
The mitigation measures proposed to be adopted to reduce the risk of accidents to livestock are:

- 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).

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

- 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).

Impeded or severed access to a plot or land
The following mitigation measure 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 (33-19)

- The Project will seek to identify whether any herders use the construction areas and aim to consult with them on 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)
- Vulnerable people will be identified during the negotiation and land acquisition process using interviews with Executive Committees and other local officials in communities, including those in charge of health, social assistance and social welfare activities, and questionnaires administered to each affected household, which will include questions specifically addressing potential vulnerability (LACF55)
- Working with relevant local authorities, SCP Co. will seek to ensure that no vulnerable people are disproportionately affected by the land acquisition process (LACF56).

Damage to land outside of the ROW and working areas
As discussed above, the project will consult with landowners and users to establish the need for temporary fencing.

The Contractor will be expected to use the designated access roads and to apply for Company consent to use any new or existing roads not designated for Project use (30-24) to reduce the damage to land outside the ROW. Vehicle movements will be restricted to defined access routes and demarcated working areas (unless in the event of an emergency) (2-02). Parking of Project-related vehicles will be restricted to designated areas (32-03).

Site assessments (taking into consideration ecology, cultural heritage, social, erosion risk, water resources) will be undertaken if the need for additional land is identified following submission of the ESIA (39-02). An environmental and social assessment report will be prepared by the Project if any additional land outside that described in the ESIA is to be used, the scale of which will depend on the proposed activities and sensitivities of the area (39-03).

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 will be maintained throughout construction, for example, by using measures such as pumping, channel diversions and fluming. Any deviations will be subject to approval of the Company (35-06)
- Affected landowners and occupiers will be consulted to determine their views on the requirement 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 will be applied (36-03)

Inability to use land for agriculture
In addition to measures discussed in Section 10.3, the following mitigation measures are proposed to reduce the level of impact to land used by the Project:

- Agricultural land will be reinstated before handover to the landowner in accordance with the Reinstatement Plan (32-13)
- The Company Land Acquisition Team, environmental representative and the construction contractors will carry out an exit inspection with the previous land owner/user of all land that was used during the construction period (32-05)
- Upon completion of construction and reinstatement, the Land Acquisition Team and the construction contractors will carry out an exit inspection with the previous land owner/user of all land that was used during the construction period (LACF50)
- If the inspection concludes that reinstatement is satisfactory, and subject to the consent of the affected landowner or land user, the usage right of the affected land plot will be handed back free of charge to him/her for agricultural activities (LACF51).

Loss of agricultural productivity
- Driving along the ROW will not be permitted in excessively wet conditions unless otherwise approved by the Company (2-03)
- Erosion control measures will be implemented to achieve erosion Class 3 or better (3-03).

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).

Damage to houses and structures
In addition to measures discussed above and in Section 10.12, the following mitigation measures are proposed to reduce the likely potential impacts to houses and structures:

- A record will be made of the condition of access roads, construction camps, lay-down areas and rail offloading areas and any special features on the ROW before construction to inform the reinstatement works (17-14)
- Pre-entry agreements including reinstatement requirements will be agreed prior to work affecting third-party assets (35-09). This will be an important mitigation for industrial users at the preferred pipe storage yard sites.

Reduced production of bees
- Community Liaison Officers will identify any beekeepers whose hives are within 300m of the pipeline and facility construction, camp and pipe storage areas or access routes before the start of the honey production season. These beekeepers will be asked to move their hives (both mobile hives and stationary hives) a suitable distance (at least 300 metres) from the route for the season (24-05).
- The Company will develop and implement a policy for the compensation of beekeepers adversely affected by Project impacts (24-06).

Potential anthrax pits
Mitigations proposed to address the potential for discovering anthrax on lands associated with herds are listed below:

- The Company will carry out a due diligence exercise to identify and manage the risk of anthrax (6-22)
- If any animal burial pits are identified during construction, works will cease in this location until the affected area has been subject to sampling by qualified personnel to determine if there is a risk of anthrax (6-25).

10.13.4.3 Construction phase: permanent and temporary facilities

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

As discussed previously, the Project will consult before restricting access to land and will establish the need for temporary fencing. Many of the measures proposed previously will apply to the temporary facilities.

Where temporary facilities are located on private land, the process will be similar to that followed for the pipeline corridor. Compensation will be agreed through a negotiated process and will be at replacement value, both for land occupation and for any standing crops.

The selection of any further access roads (in addition to those used during BTC/SCP construction) to Project working areas will aim to avoid sensitive receptors such as centres of communities, hospitals, clinics and schools as far as practicable (30-22). The contractor will be expected to use the designated access roads and to apply for Project consent to use any new or existing roads not designated for Project use.

10.13.4.4 Site-specific mitigation

Vulnerable people who may be affected by the project will be identified and specific assistance measures will be applied.

Physical displacement
With regards to the house that is affected in the village of Dallyar Dashbulak, the Project has proposed the following mitigation measures:

- Project procedures will be applied to the affected household to aim to ensure fair and transparent relocation is applied (X13-08)
- The ROW will be designed to minimise impacts. A detailed survey will be undertaken to determine the location of the Azeri gas pipeline in this area and therefore whether the SCPX pipeline can be re-routed to avoid the house and associated farm buildings (X13-09).

With regard to the livestock pens and accommodation at the new proposed block valve A6, the Project has proposed X13-08 as stated above. The livestock pens and temporary accommodation will be relocated a minimum distance of 200m from the boundary of the block valve BVR A6 (D8-04).

Loss of gardens
With regards to the houses with gardens that are affected (Alpout and Garaberk), the following mitigations measures are proposed:

- Where practicable the RoW width will be designed to minimise impact to houses (X13-06)
- The distance between the existing pipeline(s) and SCPX will be designed to reduce the number of trees that need to be removed (X13-07).

Further details on dust and noise impacts are addressed in Sections 10.8 and 10.9.

Grievance management
Mechanisms shall be put in place that allow individuals to express grievances about project-related activities and employees. As part of such mechanisms 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 will be communicated broadly to affected people, specifically through the Guide to Land Acquisition and Compensation that will be disseminated to all relevant local authorities and all affected land owners and land users.

10.13.4.5 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.

10.13.4.6 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

A detail rating of residual impacts is presented in Table 10-27 and Table 10-28. However, a number of impacts cannot be completely eliminated such as where physical displacement is needed and the residual impact remains rated as a medium significance. Where physical displacement occurs (Table 10-28) compensation is provided in line with local law and international standards.

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 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 covers potential impacts on the local/regional economies, employment, skills and livelihoods of the proposed SCPX Project 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 SCPX Project that Could Affect the Economy, Employment, Skills and Livelihoods

During construction, SCPX activities will provide opportunities for companies at the national, and possibly regional, level to supply goods and services. The SCPX Project is also expected to affect the local economies, employment, skills and livelihoods primarily by:

- Employing local people temporarily to carry out construction work on the pipeline, access roads and at camps
- Local purchases of goods and services directly by the Project and workers during construction, particularly in those PACs and other nearby communities located in the vicinity of the camps
- Potential in-migration of individuals/households during construction to take advantage of economic opportunities created by the Project. This is also discussed in Section 10.11.

Other Project activities during construction that have the potential to affect livelihoods are:

- Atmospheric emissions (especially dust) generated by construction traffic and activities that could cause a decline in crop productivity and affect the health of locals. These are discussed in Sections 10.13 and 10.12.

There are no specific impacts economic or employment impacts of commissioning.

During the operational period, only a very limited number of additional workers will be needed, as the staff that operate and maintain the existing pipelines will also cover the SCPX pipeline. There will also be only a very limited need to purchase local goods and services. No local or regional economic impacts are therefore predicted.

10.14.2 Key Sensitivities

For the PACs surveyed, the key employment and livelihood sensitivities with respect to the proposed SCPX Project are:

- Unemployment levels in the PACs are higher than the national average, and unemployment is classed a significant household issue for the PACs surveyed. There will therefore be a high sensitivity to employment opportunities created by the Project and any Project activities that affect livelihood. There will also be sensitivity to retrenchment and consequent loss of income following any temporary employment
- Lack of education and skills have been identified as one of the key reasons for PAC members being unable to gain employment. The lack of a significant skilled and semi-skilled labour force within the PACs could lead to unmet employment expectations
- Local hired employment opportunities are limited and people work in the agricultural sector. Agricultural workers will therefore have a particular sensitivity (see below)
- Agriculture is the main source of livelihood in the PACs, providing 40% of employment. Workers in the agricultural sector are generally self-employed and

therefore will be sensitive to any impacts to their ability to undertake agricultural activities

- There has been an increase in the level of women in employment in the last 10 years. Therefore the sensitivity to employment for women as a vulnerable group will be lower than during BTC and SCP construction
- General dissatisfaction among the PACs with respect to employment status (over 60% dissatisfaction) is likely to create raised expectations with respect to employment and improvement of livelihood conditions as a result of SCPX activities.

The key economic sensitivities are:

- Average monthly income is approximately 26% below the national average
- Insufficient income is the most significant household issue for the PACs surveyed. There will therefore be a high sensitivity to employment opportunities created by the Project and any Project activities that affect livelihood
- Approximately 30% of households state that their income has decreased over the past five years
- Access to business loans within the rural community is difficult due to the onerous application process and lack of knowledge within the rural population
- Approximately 40% of households are dependent on agricultural income, which would mean they have a high sensitivity to activities which would affect crop yield
- Access to sell locally produced goods at market will be a sensitivity where a PAC is not close to a main road (note that most PACs are close to the main east–west highway so this sensitivity is considered low)
- The poverty index has decreased in Azerbaijan in the last 10 years. However, this is seen to a lesser extent in the PACs and rural areas. Therefore, sensitivities with respect to economic factors within the PACs will be higher than they would be nationally, or in the urban areas, but will be lower than during BTC and SCP construction.

At the site-specific level, one village, Shusha, is comprised of internally displaced persons as a result of Nagorno–Karabakh conflict. The people in this village live in poor conditions, and the houses are made of reeds.

10.14.3 Impacts on Economy, Employment, Skills and Livelihoods

10.14.3.1 Proposed pipeline construction and commissioning, including pigging station, block valves, construction camps, pipe storage areas and rail spur and offloading areas

Pipeline construction and commissioning will lead to both national and local economic impacts. At the national level SCPX expenditure is expected to make a positive contribution to GDP growth. The extent of this beneficial impact will depend on the scale of expenditure in Azerbaijan on goods and services, for example, purchasing decisions will be contingent upon local suppliers meeting the Projects quality and reliability standards.

At local level, the following general beneficial impacts may occur as a result of pipeline construction:

- Increase in available jobs and incomes leading to enhanced circulation of money in the local economy resulting in overall economic growth
- Improved standard of living for households with members who have increased incomes due to employment of local people
- Enhanced skills among local workforce

- Increase in sales for local businesses.

The following adverse impacts may occur:

- Un-met employment expectations
- Resentment between local people who are employed by the Project and those whose applications were unsuccessful
- Resentment if jobs are perceived not to be allocated fairly between communities or there is perceived discrimination in job allocation based on education and background (particularly in relation to chronically sick or disabled (if consider themselves able to do specific jobs) and Shusha internally displaced persons (IDPs))
- Resentment against non-local Azeri workers if these are perceived to have obtained jobs instead of suitably qualified local people
- Frustration and resentment if local workers perceive that foreign workers are receiving better pay or conditions for exactly the same job
- Resentment from business owners whose offer of goods and services is refused
- Tensions resulting from cultural differences, anti-social behaviour of construction workforce, potential prostitution and attraction of 'economic migrants' at camp sites
- Increased inflation, particularly of food and housing costs
- Accidents to livestock (including poultry) resulting in loss of income/adverse livelihood impact
- Retrenchment leading to significant numbers of individuals from certain PACs losing their jobs at the same time
- Local small and medium-sized enterprises and public sector organisations 'losing' key workers to SCPX
- Subsistence farmers taking up SCPX jobs and land being neglected for periods of two years making it difficult to re-start farming when jobs cease following retrenchment.

The above impacts are discussed in more detail below.

Direct employment opportunities
The construction phase in Azerbaijan is due to commence with early works in mid-late 2014 and main works from spring 2015 to the end of 2017. Direct employment on the pipeline will vary during this period with lower numbers employed at the beginning and end of the construction period rising to a maximum of approximately 700 workers during the main work period. The majority of the workers will be based at the five construction camps and will move between camps as construction progresses. More information on employment numbers, including estimated direct employment numbers for the camps, is given in Section 5.5.2.

In addition to the above, the Project is expected to generate jobs off-site. It is predicted that this could increase the total number of people employed by the Project to approximately 1270 personnel.

The workforce will include a combination of professional/administrative, skilled, semi-skilled and unskilled workers:

- Skilled workers will include experienced staff in categories such as welding and machinery operation
- Semi-skilled workers will include experienced drivers, mechanics and night watchmen

- Unskilled work may include tasks such as sand bag filling, and acting as a banksman for machine operators.

Unskilled workers may be employed with no prior construction experience, though preference will be given to applicants with experience. Based on comparable pipeline construction projects it is anticipated that approximately 35–60% of the workforce will be local. This will include not just workers laying the pipeline and constructing the facilities, but will include people servicing the camps, such as cleaners, cooks and in secretarial/office type jobs.

It is likely that some of the local people have unrealistic expectations about the number of jobs that will be created during construction. It is likely, therefore, that applications for employment will far exceed the number of vacancies which could lead to disappointment and resentment.

Employment will increase incomes and improve quality of life, albeit temporarily, for individuals and households. This is a significant, but temporary benefit. Those who 'lose out' may feel resentment. Similarly at community level there may tensions, and even conflict, if job allocations, between communities, are not perceived as being 'fair'.

Procurement of goods and services
The types of local contracts that are anticipated during construction and operation are shown below:

- Catering services to the office camp and construction sites
- Security services at the office camp and construction sites
- Provision of food supplies (indirectly through catering services)
- Supply of some construction equipment and materials, including timber and stone.

Through providing goods and services to the Project, some people will enjoy an increased income for a short period, which will be beneficial. There may however be resentment from those who do not benefit from the Project. This impact will be localised and temporary.

Business development and improvement of local economy/livelihood
The increase in the amount of money circulating in the local PAC economies, from direct (at the camp, pipe storage and rail spur and offloading sites) and indirect (at a local supplier) job creation, may contribute to induced job creation (e.g. a shop hiring an additional worker because of increased demand) via the multiplier effect. Any such effect is expected to be small, and can probably be measured only in job-months rather than job-years, due to the temporary, short-term and limited nature of the increased income injected into the local economies by the Project spending.

Inflation at local level
Inflation is caused when demand exceeds supply or when the money supply increases significantly faster than the ability to supply desired goods and services. Inflation provides benefits as well as causing adverse impacts. Without inflation economic growth cannot occur. However, there are negative impacts such as increased poverty for those on fixed incomes or incomes that fall behind the rate of inflation increases.

It is very difficult to predict the scale and nature of inflation. Not all goods and services available increase in price at the same rate and there are fluctuations over time. In general, most adverse impacts occur when food, transport, housing and fuel costs rise steeply and continually.

In recent years, there has been an increase in cost of products and a steady trend of increasing inflation rate. Many households in the rural PACs spend most of their income on food/drink, utility services and health care and are thus sensitive to increase in their prices.

The most vulnerable include the elderly, disabled/chronic sick, and those with low and relatively static incomes.

The scale and extent of local inflation will depend, to a great extent, on the spending patterns of the construction workforces in their localities. At sites dominated by small rural PACs, workers will not be faced with extensive spending opportunities. Most purchases are likely to be small-scale such as food/drink items for immediate consumption or to be taken back by workers to their homes. This may lead to an increase in prices of some items at certain times of the year. Equally, it may give rise to an informal two-tier pricing system where higher prices are charged to 'outsiders' and lower prices to local or long-standing customers.

Overall, a small boost to earnings for sellers of fruit and vegetables that can be easily consumed 'on the spot' or for 'cottage industry' food producers of honey and fruit/vegetable preserves, and, finally, for shop-owners is more likely than any significant increase in inflation above the base trend.

Any rise in prices is unlikely to affect utility prices, healthcare and housing costs. Thus, the chronically sick/registered disabled and Shusha IDPs are unlikely to be adversely affected, except for the possibility of some small and possibly seasonal increase in the prices of food/drink items.

Loss of existing employees
Some small enterprises and the public sector may lose some key skilled workers. It may be difficult for employers to replace them easily and output/services may decline until replacements can be recruited and, if necessary, trained. This may threaten the viability of some enterprises, but as the number of enterprises is relatively small in terms of the local economies, particularly in rural PACs, this impact is likely to be very limited in scale.

Agricultural production
This may decline in some PACs if self-employed unwaged subsistence farmers take up work on the SCPX Project. Their land may be left untended or under-utilised and decline in quality. Any decline in land quality/productivity over a two-year period may necessitate considerable effort and some financial investment on the part of the owner to recover its previous potential. This potential situation could compound the problems of adjustment faced by those who lose their paid jobs.

Local competition over jobs
An increase in job opportunities as a result of SCPX construction is likely to lead to local competition over jobs. Some local people, mainly chronically sick/disabled and the IDPs at Shusha, where unemployment is higher in comparison to other PACs, and local people have a particularly poor educational background and social status, may experience special difficulty participating in the SCPX recruitment process, or could be isolated from gaining employment with SCPX. This will need careful handling particularly at Shusha IDP settlement where it may result in local resentment and frustrations.

Any unplanned in-migration has the potential to increase the level of competition. The competition over jobs and possible employment of workers (skilled and semi-skilled) from different regions may lead to local resentment.

10.14.3.2 In the operations phase (loss of jobs after construction phase)

The loss of most of the jobs created during construction, when the construction phase is completed, is expected to have an adverse effect on the livelihoods and incomes of those PAC households with construction workers. Their standard of living is likely to fall as they return to previous livelihood patterns. Some may have been able to save some money to invest in their land or to set up small businesses. It is also possible that locals could use skills gained from working on SCPX to work on other projects where a similar skill set is

needed. Some professional and technical engineers may consider moving to cities for better job opportunities.

10.14.3.3 Impact summary and assessment of significance

Table 10-29 and Table 10-30 provide an assessment of the likely significance of generic and site-specific impacts on economy, employment, skills and livelihoods before and after implementation of the proposed mitigation measures that are presented in the following section.

Table 10-29: Potential Generic Impacts on Employment, Skills and Livelihoods

Issue		Potential Impacts	Potential Impact Significance*	Mitigation and Enhancement	Residual Impact Significance*
A28	Employment	Increase in jobs available and incomes, leading to enhanced circulation of money in local/PAC economies resulting in overall economic growth, albeit small-scale	Beneficial	28-04, 28-02, 28-03, 28-05, 28-06, 28-07, 28-08	Beneficial
		Unmet employment expectations and/or resentment between local people who are employed by the Project and those whose applications were unsuccessful	C4 Medium	28-03, 28-04, 28-02, 28-05, 28-06, 28-07, 28-08, 28-15, 28-17, 28-22, 28-23	C3 Medium
		Improved standard of living for households with members who have increased incomes due to employment of local people	Beneficial	--	Beneficial
		Enhanced skills among local workforce	Beneficial	19-06, 22-02, 27-11, 28-09, 28-10, 28-11, 28-12, 28-13	Beneficial
		Retrenchment/loss of jobs	C4 Medium	28-14, 28-11, 28-21, 28-22	C3 Medium
		Loss of skilled employees to SCPX from small and medium-sized enterprises and public sector and adverse effect on output/service delivery	C2 Low	28-02, 28-05	C2 Low

Issue		Potential Impacts	Potential Impact Significance*	Mitigation and Enhancement	Residual Impact Significance*
		Agricultural lands not cultivated for up to 2–3 years as self-employed subsistence farmers work for SCPX and then farmers find it difficult to take up farming again after losing jobs	C2 Low	28-20	C2 Low
A28	Community relations	Local concerns associated with recruiting local contractors/workers from regions away from the Project	C3 Medium	28-02, 28-03, 28-08, 28-17, 33-01, 33-03, 33-13	C2 Low
A29	Provision of goods and services	Increase in sales for local businesses and those involved full/part - time in 'cottage' industries	Beneficial	28-18, 1-02, 29-03	Beneficial
		Resentment from business owners whose offer of goods and services is refused	C3 Medium	28-18, 1-02, 29-03	C2 Low
A33	Community relations	Tensions resulting from cultural differences, anti-social behaviour of construction workforce, potential prostitution and attraction of 'hangers on' at camp sites	C4 Medium	33-02, 33-03, 33-04, 33-06, 33-08, 33-09, 33-10, 33-11, 33-13, 33-15	C3 Medium
		Frustration and resentment if local workers perceive that foreign workers are receiving better pay or conditions for exactly the same job.	C 4 Medium	33-01, 33-02, 28-14, 28-15	C3 Medium

* assessed using Tables 3-21 and 3-23

Table 10-30: Potential Impacts on Employment, Skills and Livelihoods at Specific Locations/Receptors

Location	Issue	Potential Impacts	Potential Impact Significance*	Mitigation and Enhancement	Residual Impact Significance*
KP59	Shusha IDP	Unmet employment expectations and/or resentment between local people who are employed by the Project and those whose applications were unsuccessful	E5 High	28-03, 28-04, 28-02, 28-05, 28-06, 28-07, 28-08, 28-22	E2 Medium

* assessed using Tables 3-21 and 3-23

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

10.14.4.1 Proposed pipeline construction and commissioning, including pigging station, block valves, construction camps, pipe storage areas and rail spur and offloading areas

Employment

Unskilled labour will be preferentially recruited from the Project Affected Communities (28-02). The Project will give priority to people from the construction camp PACs for employment opportunities within the camp where suitably qualified (e.g. cook, housekeeper, etc) (28-23). Applications for employment will only be considered if submitted via the official application procedure (28-03). Targets for local recruitment from PACs will be agreed with the Contractor. These will be designed to meet legal requirements (28-04). The Project will seek to manage employment expectations by explaining the number and type of opportunities in advance to local communities via the Community Liaison Officers (28-05).

Recruitment procedures will be transparent, public and non-discriminatory and open with respect to ethnicity, religion, sexuality, disability or gender (28-06).

Clear job descriptions will be provided in advance of recruitment and will explain the skills required for each post (28-07). Job vacancies will be advertised in the PAC through appropriate and accessible media (consistent with employment targets) (28-17). Community Liaison Officers will monitor that PACs are given priority in recruitment and that recruitment is non-discriminatory in terms of PACs and ethnicity (28-08).

The Contractor will prepare a retrenchment plan, with the aim of reducing the impacts of cessation of employment contracts (28-21). The Contractor will explain the temporary nature of jobs during the recruitment process and explain to workers the need to prepare for losing jobs and to manage their income wisely while employed (28-22). The Contractor will advise workers about risks of neglecting their land during recruitment process (28-20).

When appropriate, on-the-job training will be provided to enable local employees gain new and/or improved skills while working on the Project (28-09). The workforce training programme will include refresher and induction training with the aim of ensuring that all recruits have the necessary understanding and knowledge levels for each job, in particular with regard to HSE issues (28-10).

Environmental and social issues will be included in workforce and visitor induction training (28-11).

Particular emphasis will be paid to health and safety and community relations, with additional technical toolbox talks given on specific issues (28-12). Additional on-the-job informal training sessions and discussions will be provided as necessary during construction of the different SCPX component projects (28-13).

All workers will receive at least the minimum wage as defined by Azerbaijan national law (33-02). All workers will have contracts describing conditions of work and will have the contents explained to them (28-14). As part of the recruitment programme community liaison teams will seek to manage any misconceptions about perceived differences in pay or conditions (28-15).

Procurement of goods and services

Environmental considerations will be included in the project procurement process (1-02). A Plan will be developed and implemented that will aim to discourage and prevent the workforce from purchasing goods from informal vendors to discourage vendors from establishing themselves at construction camp fence-lines in the hope of securing additional business (28-18).

Taking into account relevant commercial considerations as appropriate, the Project will seek to purchase goods and services from within Azerbaijan and will monitor such purchases (29-03).

Community relations
The Contractor will be required to develop and implement a Grievance Procedure to provide opportunity for local residents to raise concerns (33-01). Mechanisms shall be put in place that allows individuals to express grievances about project-related activities and employees. As part of such mechanisms a grievance register will be used to document all third party grievances, corrective actions and outcomes (33-13).

The community liaison teams will maintain regular liaison with local communities before, during and after construction (33-03).

An employee Code of Conduct will be prepared and issued to all recruits and camp residents during the employee induction process. (33-04). The Employee Code of Conduct will prohibit the workforce from participating in illegal activities, including use of illegal drugs, bribery and corruption or requesting or receiving gifts from communities (33-06). A Company policy limiting alcohol consumption in construction camps will be applied (33-08). Workforce training will include a briefing on camp rules and awareness of local issues and sensitivities (33-09).

No unauthorised access to, or use of, camp facilities will be allowed (33-10). A range of recreational facilities will be provided within the camps to reduce the need for finding recreation in the local community (33-11).

10.14.4.2 In the operational phase

A community development initiative has been in operation in Azerbaijan since 2003 to build and maintain positive relationships with the pipeline communities by socio-economic development. The next phase of the programme is planned to start in 2012 and will include the SCPX Project communities.

10.14.5 Residual Impacts

Overall the SCPX Project is expected to bring economic benefits to local communities and the regions where the PACs are located. It is anticipated that SCPX will have a beneficial effect on PAC employment levels and household incomes/standard of living during construction, but no impact on these aspects once it is operational although improved skill levels may have a longer term beneficial impact on employability. It is inevitable, however, that some people will be disappointed by not securing employment on the Project. The impact in terms of un-met employment expectations despite the measures taken to provide transparent information, therefore, is classified as medium.

There will be significant phases of retrenchment where many will lose their jobs in a short timescale. This will have an adverse impact on individuals, households and many small PACs. This impact can be mitigated, to some extent and the residual reduced to medium (refer to Section 16.4.1 ESMMP, Appendix D).

Some small-scale economic disruption is likely to occur as small and medium enterprises and public sector organisations lose employees to SCPX and agriculture is neglected by farmers who obtain an SCPX Project job. These impacts cannot be easily mitigated, but are considered to be of low significance.

Despite the mitigation measures there remains a reasonable probability that there will be community dissatisfaction with elements of job allocation and remuneration. This potential impact is considered to likely be of medium significance.

There remains a reasonable probability that there may be tensions (and, potentially, localised expressions of conflict between the construction camp workers (especially if

perceived to be 'foreigners') and local people. This potential impact, also, is considered likely to be of medium significance.

Through providing goods and services to the Project, some people will enjoy an increased income for a short period, which will be beneficial. However, there may be resentment from those who do not benefit from the Project. This impact will be localised and is therefore assessed as likely being of low significance.

10.15 Infrastructure and Services

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

10.15.1 Aspects of SCPX Project that Could Affect Infrastructure and Services

The proposed SCPX Project will:

- 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 for construction camps, the pigging station and block valves
- Use existing roads for the transport of materials, equipment, plant and workers to and from construction camps, pipe storage areas and rail spur and offloading areas and the ROW which may lead to road damage
- Require the pipe to be laid under roads and railway lines that cross the route
- Construct a permanent access road to the pigging station, which will extend from the existing access track
- Widen and upgrade existing access roads, where needed to provide access to the ROW and other temporary construction sites
- Construct new temporary access roads where needed to provide access.

The following potential Project impacts on infrastructure are assessed elsewhere in Chapter 10. In particular, the Project will:

- Provide economic opportunities that may attract in-migrants, that may in turn place strain on existing infrastructure and services, see Section 10.10
- Use roads and railways, 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
- Cross irrigation channels and canals see Sections 10.5 and 10.13
- Potentially attract migrant labour, leading to stress on PAC services such as education and housing, see Sections 10.10 and 10.13.

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

10.15.2 Key Sensitivities

The main east-west (Baku to Georgia) highway parallels the proposed SCPX route and will carry construction traffic for the majority of the way to and from the camps, pipe storage areas and rail spur and offloading areas. The east-west highway has recently been upgraded to a four-lane highway as part of the Silk Road project and is in very good condition.

The majority of main roads likely to carry the bulk of construction traffic are in good condition and suitable for heavy goods vehicles, although at two of the locations surveyed as part of the traffic survey reported in Chapter 7, upgrading or repair may be needed. However, minor roads and roads through villages are generally narrow and in a poor state of repair with large potholes.

In the PACs surveyed, the infrastructure and services sensitivities with respect to potential SCPX Project impacts are:

- Waste disposal facilities are generally in poor condition or unavailable. There has been no significant improvement in the last few years
- Lack of sewerage is the most significant issue with respect to living conditions in the PACs. In many communities, sewerage discharges directly into an open drain or ditch. There has been no significant improvement in the last few years
- Lack of mains potable water. PACs rely mainly on tankered-in water, and in some cases wells to abstract groundwater for potable use
- Poor general state of housing and other buildings in the PACs. A significant number of houses are reported to be in a poor state of repair
- Access to electricity is reported to be almost 100% in the rest of the country, although occasional power outages occur.

10.15.3 Impacts on Infrastructure and Services

10.15.3.1 Proposed pipeline construction and commissioning, including pigging station, block valves, construction camps, pipe storage areas and rail spur and offloading areas

Damage to third-party cables and pipelines
The proposed SCPX route will cross a large number of existing pipelines and cables[15]. Some of the pipelines are known to be in poor condition and therefore vulnerable to damage, with potential impacts on the supply of services. Some electricity lines also need to be re-routed to clear construction camps, pipe storage sites and rail spur and offloading areas, with the potential for temporary disruption of services while they are re-sited – in particular there are overhead electrical lines at Poylu Rail Spur and Offloading Area and Kurdemir Rail Spur and Offloading Area. There are also water pipes at Saloghlu Rail Spur and Offloading Area.

The construction camps need energy and will need to dispose of sewage and grey water:

- Energy, in the form of electricity, will generally by supplied by on-site generators. It is possible that some of the camps may establish a connection to the mains electricity supply, but this would only be done following a review of the capacity of the system with the aim of avoiding impacts on communities or other users. Gas will not be used
- Sewage treatment plants will be installed at camps, as described in Section 10.5.4.2, so there should be no significant impacts on any local sewage plants.

Road and rail crossings
The proposed SCPX route will cross a number of main and minor roads and the main Baku–Tbilisi railway line. Currently, six crossings of railway lines are anticipated and approximately 76 crossings of roads of which 42 are asphalted and a further two are paved roads; the remainder are unpaved except for 3 where the road surface is currently unspecified.

[15] The current estimate is that the pipeline will cross 246 underground pipes or cables, 238 overhead cables and 47 above ground pipes or cables

Where a main road or the railway line is crossed, in the pipeline will be installed below the road or rail track using non-open-cut techniques, see Chapter 5, that will not disrupt the flow. Where more minor roads or tracks are crossed, open-cut techniques may be used, with one half of the road being constructed and backfilled, followed by the other. Traffic flow on these roads is generally low, and flow will be maintained. The impact is therefore considered likely to be of low significance.

New and upgraded roads
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. However, depending on existing access to the ROW new temporary access roads may be installed to ensure that access is available approximately every 5km. In particular, new temporary access roads are likely to be needed at the following locations:

- Where the proposed SCPX route deviates from the existing BTC/SCP routes between SCPX KP168 and KP179
- Between SCPX KP247 and KP248
- At the following preferred camp, pipe storage and rail spur and offloading locations: Kurdemir Camp Option 5, Yevlakh Pipe Storage Area and Yevlakh Rail Spur and Offloading Area, Goranboy Camp Option 3. The impacts of these roads are discussed in Sections 10.7, 10.10 and 10.13 as needed (as potential impacts are on ecology, land use or cultural heritage – there are no infrastructure impacts)

The existing access track to the Saloghlu Rail Spur and Offloading Area will need to be widened or an alternative access provided to existing users. The existing access road to Kurdemir Pipe Storage Area Option 1 and 2 (Mususlu) will be upgraded. There are two options for upgrade of this road – Option A and Option B, as discussed in Section 10.7.3.2. Option A could be left in place after construction, Option B is unlikely to be left in place as this would lead to the permanent loss of a strip of agricultural land.

Where roads are improved, this could have a beneficial impact for local communities (in terms of improving access to services and markets); however, it could also impact on ecology and archaeology, and may have associated livelihood impacts should agricultural land be either temporarily or permanently lost.

Damage to roads and bridges
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. Deterioration in road conditions, in turn, could have secondary impacts such as an increased risk of accidents (see Section 10.12), or impacts on land use and ecology if informal bypasses around poor sections of road are created.

However, road widening and improvement by the Project will also result in more efficient transport links for local people.

10.15.3.2 Pipeline operation

Small water tanks (approximately $2m^3$) will be installed for domestic water supply at the pigging station and block valves. These will be filled periodically from a road tanker.

The pigging station in Azerbaijan will use five to eight TEGs, depending on the supplier, powered by gas from the pipeline, to supply the site with electricity, with any possible additional power requirements being supplied by a temporary generator; there will be no

need, therefore, to take power from the grid. The block valves will be connected to mains electricity, but have minimal power requirements that should not affect other users.

If permanently manned, domestic sewage from the pigging station will either be treated on or off-site (D5-080). However, it should be noted that the quantities generated will be very low as there are generally only two security guards stationed at the block valves and two guards plus visiting maintenance staff at the pigging station.

No significant impacts of these minor service needs on existing infrastructure are predicted and operation is therefore not discussed further in this section.

10.15.3.3 Impact summary and assessment of significance

Table 10-31 provides an assessment of the likely significance of impacts on infrastructure and services (including roads) before and after implementation of the proposed mitigation measures which are discussed in the following section.
Table 10-32 summarises site-specific impacts.

Table 10-31: Potential Generic Impacts on Infrastructure and Services

Issue		Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
A35	Damage to third party infrastructure (pipelines, cables etc.)	Temporary loss of supply to other consumers.	D3 Medium	35-01, 35-02, 35-03, 35-04, 35-09, D30-01	D2 Medium
A37	Use of local road network by construction traffic	Deterioration of road conditions leading to increased journey time, damage to vehicles, increased risk of accidents, creation of informal off-road bypasses	A-D 1-3 Low to Medium	37-07, 37-08, 37-17, 37-20	A-C1 Low
		Road widening and improvement resulting in more efficient transport links for local people	Beneficial		Beneficial
A38	Road closure	Disruption of traffic flows causing inconvenience to local users	A-C2 Low	37-01, 37-02, 37-03, 37-14	A-C1 Low

* assessed using Tables 3-21 and 3-24

Table 10-32: Impacts on Infrastructure and Services at Sensitive Locations and/or Receptors

Location	Issue	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
Pigging Station (KP0)	Improvement of existing access tracks and construction of new access road to the pigging station	Improvement of access for existing users	Beneficial	X5-13	Beneficial

Location	Issue	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
Agstafa Camp Option 3	Creation of passing spaces on existing access road	Improvement of access for existing users	Beneficial	None needed	Beneficial
Kurdemir Rail Spur and Offloading Area	Overhead electrical lines	Temporary disruption to users while lines are moved	C or D4 Medium-High	35-01, 35-02, 35-03, 35-04, 35-09	C or D1 Low
	Upgrading of existing access road under Option A – see Kurdemir Pipe Storage Area Option 1 and 2 (Mususlu)	See Kurdemir Pipe Storage Area Option 1 and 2 (Mususlu)			
Kurdemir Pipe Storage Area Option 1 and 2 (Mususlu)	Upgrading of existing access road under Option A	Improvement of access for existing users	Beneficial	None needed	Beneficial
Poylu Rail Spur and Offloading Area	Overhead electrical lines	Temporary disruption to users while lines are moved	C or D4 Medium-High	35-01, 35-02, 35-03, 35-04, 35-09	C or D1 Low
Saloghlu Rail Spur and Offloading Area	Existing access will need to be widened or an alternative access provided to existing users	Improvement of access for existing users	Beneficial	None needed	Beneficial
	Water pipes	Temporary disruption to users while lines are moved	C or D4 Medium-High	35-01, 35-02, 35-03, 35-04, 35-09	C or D1 Low

* assessed using Tables 3-21 and 3-24

10.15.4 Mitigation of Impacts on Infrastructure and Services

10.15.4.1 At the design stage

The new access road to the pigging station will follow existing tracks where possible (X5-13).

10.15.4.2 Proposed pipeline construction and commissioning, including pigging station, block valves, construction camps, pipe storage areas and rail spur and offloading areas

Damage to third-party cables and pipelines

The following measures will be taken to reduce any impacts on other infrastructure: Contractor will prepare a Method Statement that includes measures to protect the integrity of the third-party services and is acceptable to the service operator (35-01). Pre-entry agreements including reinstatement requirements will be agreed prior to work affecting third party assets (35-09). Any damage to third-party services to be repaired promptly in

consultation with, or by the service operator (35-02). Any planned diversion of services will be communicated to local authorities and affected communities at least 72 hours in advance of the works (35-03). In the event of a disruption to services the Contractor will work with the service owner to effect repair in reasonable time (35-04). Where it is considered that there is a higher risk of the pipeline being damaged or interfered with, or where other services are crossed and at track and road crossings, the pipeline will be covered by concrete slabs at open cut crossings (D30-01).

Road and rail crossings
Minor road and track crossings will be accomplished by open trenching. Where it is necessary to maintain traffic flow, the crossing will be made in two stages, and only one half of the road width will be used at a time. Steel plates will be laid to maintain one lane of through traffic (37-14). Advance warning (at least 72 hours) of any road/track closures will be provided to local communities (37-01). A bypass/alternative routes will be provided at locations where road closure is unavoidable (37-02). Temporary traffic control (e.g. flagmen) and signs will be provided where necessary to improve safety and provide directions (37-03).

New and upgraded roads
Prior to selection all access routes will be subject to a multidisciplinary assessment (37-20).

Arrangements for compensation of any land owners or users affected will be carried out in accordance with the approach described in Section 10.13.4.

Damage to roads and bridges
The Project will undertake a road condition survey before construction begins in areas as defined by Project (37-17). Surface of frequently used access roads will be subject to regular inspections and repair, with the aim of ensuring they are maintained in a good condition particularly where fragile buildings are close to roads (subject to site-specific survey) (37-08). Following construction, the Contractor will repair roads to at least their pre-construction condition (37-07).

10.15.4.3 In the operations phase

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

10.15.5 Residual Impacts

Unplanned damage or disruption to infrastructure and utility services as a result of construction activities is expected to reduce in probability, with the mitigation measures described, but is unlikely to be entirely eliminated so the residual impact is considered to be of medium significance, but will be of very temporary duration until services are reinstated. A similar situation pertains to disruption of rivers and streams, but the significance of the impacts of groundwater abstraction in terms of the water table and indirect effects on surface water bodies such as springs is considered to be low, with the mitigation measures described in Section 10.6.

Any improvements to existing roads will benefit the communities as transport of people and goods will be easier and more cost-effective. In some cases it may be of more direct economic benefit to local communities if access to markets for goods/services is enhanced.

10.16 Traffic and Transport

This section covers potential impacts on traffic and transport during construction and operation of the proposed SCPX Project 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 Project activities 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 10.12)
- Disruption of traffic flows causing inconvenience to local users
- Movement of pipe by rail from the port at the Black Sea coast in Georgia to rail heads along the pipeline route via the main Baku to Tbilisi railway line
- Transport of aggregate from quarries and borrow pits to construction sites (camps, pipe storage areas, rail spur and offloading areas, BVRs and pigging station) and the pipeline ROW
- Transport of line pipe to pipe storage areas and from pipe storage areas to the ROW
- Transport of equipment from rail heads to lay-down areas at the pigging station and BVR construction sites
- Transport of workers to and from construction camps, 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 in the area of the proposed SCPX Project are detailed below, following a traffic baseline survey which was undertaken in February 2012.

The main east-west (Baku to Georgia) highway parallels the proposed SCPX route and will carry construction traffic for the majority of the way to and from the camps, pipe storage areas and rail spur and offloading areas. The east-west highway has recently been upgraded to a four-lane highway as part of the Silk Road project and is in very good condition.

The majority of main roads likely to carry the bulk of construction traffic are in good condition and suitable for heavy goods vehicles. However, minor roads and roads through villages are generally narrow and in a poor state of repair.

Traffic flows generally decrease towards the west as the distance from Baku increases, although there are no signs of congestion on any of the roads.

Pedestrians comprise a low percentage of the total count, but often walk directly on the road, which increases their vulnerability to accidents. ‘Trading’ locations are present along the east-west highway where roadside stalls and livestock herding are commonplace, which also increases the risk of accidents.

10.16.3 Impacts on Traffic and Transport

10.16.3.1 Proposed pipeline construction and commissioning, including pigging station, block valves, construction camps, pipe storage areas and rail spur and offloading areas

Additional traffic

The Project will generate additional road traffic during construction as a result of:

- Transporting the workforce to the ROW and facilities construction sites, 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 construction camp construction, road improvements, pipe bedding and pigging station and BVR construction
- Transport of concrete for pigging station and BVR construction
- Transport of line pipe and large equipment from the rail spur/off-loading areas to pipe storage areas (where these are not located adjacent to the rail spur) and from pipe storage areas to the ROW, the pigging station and the BVR sites
- Transport of other materials, such as fuel, food, water, to the construction camps and 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, and around major non-open-cut crossings where no bridge can be installed over the crossing for plant and vehicles to travel from one side to the other. 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 16,150 vehicle movements will be needed to transport the pipe. However, pipe storage areas have been chosen, where possible, to be adjacent to both the rail spur and off-loading area and the ROW to minimise the need to transport pipe on public roads. In particular, road transport of pipe will not be required at the following rail spur, off-loading and pipe storage areas although some traffic to access the sites themselves will be needed to prepare and reinstate the sites and by workers when the sites are in use:

- Gazanchi Rail Spur and Offloading Area and Pipe Storage Area Option A and B
- Mugan Pipe Storage Area, Rail Spur and Offloading Area
- Poylu Rail Spur and Offloading Area and Pipe Storage Area
- Yevlakh Rail Spur and Offloading Area and Yevlakh Pipe Storage Area (although a very limited amount of pipe will still need to be transported by road to parts of the ROW).

At the Gazanchi Rail Spur and Offloading Site and Pipe Storage Area Option A and B, traffic on the public road will need to be stopped briefly when large construction vehicles need to access the site and the residents of a nearby house and farm will need to use a different, slightly longer access to their houses.

Road transport will be required to transport pipe at the following sites. Road traffic movements associated with the transport of pipe at these sites will be approximately 15–20 heavy trucks per day:

- Dallar Pipe Storage Area to the ROW
- From Dallar Rail Spur and Offloading Area to Dallar Pipe Storage Area Option 1B (Bayramli) and from Bayramli to the ROW

- Kurdemir Rail Spur and Offloading area to the Kurdemir Pipe Storage Areas Options 1 and 2 (Mususlu) and from there to the ROW
- Saloghlu Rail Spur and Offloading Area to the Saloghlu Pipe Storage Area and from there to the ROW.

At Saloghlu Rail Spur and Offloading Area the existing access into the site will need to be widened or an alternative access provided to the existing users of the road and site.

Approximately 6500 truck trips will be associated with moving aggregate from the extraction location to the point of use. An estimated 1750 truck movements will be required to transport concrete to the pigging station and BVRs. The estimated number of vehicles required to transport water for hydrotesting could result in approximately 4000 truck movements (trucks with a capacity of 20m^3).

The camp locations have been selected to be off roads that are generally suitable for heavy construction vehicles (with the potential exception Agstafa Camp Option 3 where passing spaces may need to be provided) and to reduce the travel time to the ROW on each spread, to minimise the distance personnel are need to travel on public roads. It is not known what proportion of the workforce will be employed from local communities, and will need to travel to the construction sites either in private vehicles or in buses. As far as practicable, transport of personnel to and from the ROW will be by bus to reduce traffic movements. Construction traffic flows will vary at different stages of the Project but it is predicted that there will be 80–100 movements a day, on average, with peaks up to 160–180 movements a day for each camp location for plant and other traffic.

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.

The line pipe will be delivered to the pipe yards by rail. It will then be transported to the ROW by low loader. Transporting pipe by rail may have impacts on the capacity of the rail system. These impacts are discussed in Chapter 11 as they are linked to and affected by a proposed upgrade project to the main railway line from Baku to Tbilisi.

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

Table 10-33 provides an assessment of the likely significance of potential traffic impacts before and after implementation of the proposed mitigation measures that are discussed in the rest of this section.

Table 10-33: Assessment of Impact of Traffic and Transport

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

* assessed using Tables 3-21 and 3-27

Table 10-34: Impacts on Traffic and Transport at Sensitive Locations and/or Receptors

Location	Issue	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
Agstafa Camp Option 3	Use of local road network by construction traffic	Congestion leading to delays	C4 Medium	30-24, 37-04, 37-05, 33-14, X16-01	B3 Low
Dallar Rail Spur and Offloading Area	Use of local road network by construction traffic	Congestion leading to delays	B2 Low	30-24, 37-04, 37-05, 33-14, D5-036	B2 Low
Dallar Pipe Storage Area	Use of local road network by construction traffic	Congestion leading to delays	B2 Low	30-24, 37-04, 37-05, 33-14, D5-055	B2 Low
Dallar Pipe Storage Area Option 1B (Bayramli)	Use of local road network by construction traffic	Congestion leading to delays	A2 Low	30-24, 37-04, 37-05, 33-14, D5-055	A2 Low
Gazanchi Rail Spur and Offloading Area and Pipe Storage Area Option A and B	Use of local road network by construction traffic; disruption of traffic flows causing inconvenience to local users	Congestion leading to delays	C3 Medium	30-24, 37-02, 37-04, 37-05, 33-14, D5-036	C2 Low
Goranboy Camp Option 3	Use of local road network by construction traffic	Congestion leading to delays	A1 Low	30-24, 37-05, 33-14,	A1 Low

Location	Issue	Potential Impacts	Potential Impact Significance*	Mitigation	Residual Impact Significance*
Kurdemir Rail Spur and Offloading Area and Kurdemir Pipe Storage Area Option 1 and 2 (Mususlu)	Use of local road network by construction traffic	Congestion leading to delays	D4 High	30-24, 37-04, 37-05, 33-14, D5-055,	D1 Low
Kurdemir Camp Option 5	Use of local road network by construction traffic	Congestion leading to delays	A2 Low	30-24, 37-04, 37-05, 33-14,	A2 Low
Mugan Pipe Storage Area, Rail Spur and Offloading Area	Use of local road network by construction traffic	Congestion leading to delays	E3 Medium	30-24, 37-04, 37-05, 33-14, D5-036,	E1 Low
Poylu Rail Spur, Offloading Area and Pipe Storage Area	Use of local road network by construction traffic	Congestion leading to delays	A2 Low	30-24, 37-04, 37-05, 33-14, D5-036,	A2 :Low
Saloghlu Rail Spur and Offloading Area	Use of local road network by construction traffic	Congestion leading to delays	D4 High	30-24, 37-04, 37-05, 33-14, X16-03	B3 Low
Saloghlu Camp and Pipe Storage Area	Use of local road network by construction traffic	Congestion leading to delays	B3 Low	30-24, 37-04, 37-05, 33-14, D5-055	B3 Low
Samukh Camp Option 3	Use of local road network by construction traffic	Congestion leading to delays	B to C3 Low to Medium	30-24, 37-04, 37-05, 33-14	B to C2 Low
Yevlakh Rail Spur and Offloading Area and Yevlakh Pipe Storage Area	Use of local road network by construction traffic	Congestion leading to delays	B2 Low	X9-05, 30-24, 37-04, 37-05, 33-14, D5-036	B2 Low

10.16.4 Mitigation of Impacts of Traffic and Transport

10.16.4.1 At the design stage

At Agstafa Camp Option 3, passing places will be constructed along the access road (X16-01).

At Saloghlu Rail Spur and Offloading Area, the existing access will be widened or an alternative access provided for existing users (X16-03).

At the Yevlakh Pipe Storage Area, Rail Spur and Offloading Areas a new access road will be created away from existing houses and occupied residences (X9-05).

10.16.4.2 Proposed pipeline construction and commissioning, including pigging station, block valves, construction camps, pipe storage areas and rail spur and offloading areas

Additional traffic

The Project will use the existing access roads established for construction of the BTC and SCP pipelines to access the pipeline ROW as far as practical (37-18). The contractor will be expected to use the designated access roads and to apply for Company consent to use any new or existing roads not designated for Project use (30-24).

Construction camps and pipe storage yards will be established along the pipeline route, and will be conveniently located for access from the main east-west highway. The project will aim to provide buses to transport non-camp resident workers to the construction sites (37-11) with the aim of reducing the number of private cars making individual journeys on Project business.

Pipe yards will be established a short distance from the rail offloading areas. The 56" line pipe will be imported into Azerbaijan from pipe-fabricating/pipe-coating factories via the Black Sea port of Poti in Georgia. Each length of line pipe weighs approximately 9.5 tonnes and approximately 36,080 12m-long pipe lengths will be needed. The line pipe will be transported by rail to offloading points and pipe storage areas to reduce the number of HGV movements (D5-036). Line pipe shall be transported by trucks from the pipe yards to the ROW along approved access routes and then along the ROW to the required location (D5-055).

Temporary traffic control measures will be employed at road crossings and junctions (flagmen, temporary traffic lights) where a safety risk assessment has identified traffic control measures will reduce the risk of traffic accidents (37-04). This will also have the effect of managing traffic congestion and delays.

The authorities will be notified when oversize heavy loads need to be transported and the loads will be escorted by the Project (37-05).

To avoid disturbance of particular local events such as funeral ceremonies by construction traffic, the Community Liaison Officers will encourage local community authorities to provide advance warning of funerals (and other similar events) so that the Contractor can avoid the movement of heavy vehicles, equipment and pipe through settlements at these times (33-14).

Traffic management measures will be developed and implemented with the aim of minimising impact to communities (X12-05) on the access roads associated with Gazanchi Rail Spur, Offloading Site and Pipe Storage Area Option A and B, Kurdemir Rail Spur and Offloading Area, Kurdemir Pipe Storage Area Option 1 and 2 (Mususlu), Mugan Rail Spur, Offloading Area and Pipe Storage Area and Samukh Camp Option 3.

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.