Chapter 5 Project Description
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5 PROJECT DESCRIPTION

5.1 Introduction

This chapter of the ESIA describes the Project design updates, taking account of the alternatives selected for the Project that have been discussed in Chapter 4 of this ESIA Addendum. A decrease in pipeline diameter from 56” to 48” results in some minor variations that have been highlighted below; the engineering and construction approach, described in Chapter 5 of the SCPX Final ESIA, remains largely unchanged and is referred to throughout this chapter.

The base case will be subject to refinement and potential change during the ongoing detailed engineering phase. This chapter represents the proposed project description as this document is subject to review and approval by the appropriate Azerbaijani authorities.

Aspects of the updated Project design that have been developed specifically to mitigate potential environmental or social impacts have been included in the commitment register (Appendix E). Figure 10.1 in Chapter 10 shows how commitments in the ESIA are linked to the Commitments Register.

Where kilometre points (KPs) are mentioned to describe the location of certain feature, these denote the nearest kilometre point on the updated SCPX pipeline loop. Where no SCPX pipeline is present, the KP denotes the nearest kilometre point on the existing SCP pipeline. The SCPX in Azerbaijan will commence at SCPX KP0, which is at approximately KP23 on the existing SCP pipeline.

The activities described in this chapter of the ESIA are the focus of the impact assessment presented in Chapters 10 and 12.

5.2 Project Objective and Overview

The objective of the SCPX Project is to increase the capacity of the existing SCP pipeline to enable the transport of an additional 16 bcma of gas from the Shah Deniz 2 development in the Caspian Sea in Azerbaijan to the Georgia–Turkey border. The gas will be supplied to domestic markets in Georgia and Turkey, with the majority of the gas being transported onwards to European markets.

To increase the gas transport capacity, the following modifications to the existing SCP pipeline system in Azerbaijan are proposed for the SCPX Project. For a complete overview of the SCPX Project please refer to SCPX Final ESIA Chapter 5.

- A 48”-diameter (1219mm) looped pipeline in Azerbaijan starting at SCPX KP0 (SCP KP23) and continuing to SCPX KP424. The change to 48” now includes an additional 34km of pipeline at the eastern end of the pipeline in Azerbaijan. The additional section of pipeline will be routed parallel to the existing SCP and Baku–Tbilisi–Ceyhan (BTC) pipelines for much of its length
- The intermediate pigging station will therefore be re-located to the new start point of the pipeline loop in Azerbaijan at SCPX KP0 (SCP KP 23)
- In Georgia the pipeline diameter will also be reduced to 48” and an additional c.6km of pipeline will be constructed, extending to SCPX KP62.3 instead of KP57. The additional section of pipeline will be routed parallel to the existing SCP and BTC pipelines
- The pigging station in Georgia will therefore be relocated to KP62.3 where the new pipeline reconnects with the SCP pipeline
- A 2.5km section of 48” pipeline in Georgia between SCP 689-691 is required for a connection between SCPX and the Trans Anatolian Gas Pipeline (TANAP) in Turkey
- Areas for the temporary installation of vents at the Pigging Station and the Block Valve in Georgia (KP28).

The proposed SCPX pipeline loop and associated aboveground installations (AGIs) are shown in schematic form in Figure 5-1.

Figure 5-1: Schematic 48” SCPX Pipeline and Facilities

The purpose of this chapter is to describe the Project design updates associated with the change in pipeline diameter from 56” to 48”. Throughout the text it will be necessary to refer to the overall Project at certain points to provide context, although repetition with the SCPX Final ESIA has been avoided by cross referencing where appropriate.

The updated SCPX project change from a 56” to a 48” pipeline results in a reduction in flow area resulting in greater pressure losses. Therefore to ensure the current design at the two compressor stations are the same as they were for the 56” design, the 48” looped sections will have to be extended from the 56” looped design. The Azerbaijan loop (loop 1) will have to extend back towards Sangachal by 34 km.

Designing the pipeline concept such that hydraulic requirements are met is of key importance. Therefore determining where the start location for loop 1 extension is required to ensure the suction pressure at CSG1 matches that of the original 56” design. The aim is to understand where the pressure drops and finding the best point that balances the pressure needs of the Project. In Azerbaijan, this point is at SCP KP24.5 where the pressure remains high enough not to compromise the 42”. However due to the terrain being unsuitable at KP24.5 for a pigging station, the start of the Loop required moving to satisfy both geographical and hydraulic requirements.

Pressure decreases over distance, but non-linearly. Figure 5-2 shows the pressure losses in the SCP system and compares the pressure in the different systems. The pressure requirements at CSG1, CSG2 and the Turkish border are all met by the 48” system at +16bcma. A suitable location for the start of the 48” pipeline in Azerbaijan is determined to be at SCP KP23 owing to unsuitable terrain at KP24.5 and to end at SCP KP502 in Georgia. A second 48”-diameter loop between SCP KP 689 and 691 in Georgia is required for a connection between SCPX and the TANAP pipeline in Turkey.
Figure 5-2: Pressure Losses in South Caucasus Pipeline System

Compared to the initial 56" pipeline design presented in Chapter 5 of the SCPX Final ESIA, the loop will include an additional 34km between SCP KP 23-57 (see Figure 5-3). Although the pipeline hydraulics will allow the pigging station to be located at KP 24.5, the station will be moved to KP 23 where the terrain is flat and amenable to construction of the facility.
Figure 5-3: Additional Pipeline Loop in Azerbaijan
The location of the start point has the advantage of avoiding having to cross or route around the Gobustan World Heritage site. The route will cross active fault zones, challenging terrain and canal crossings as well as sensitive habitats.

There is no expected temperature change in the 42” pipeline with the additional 16bcma of gas that will be carried. The inlet temperature of the gas at Sangachal is the same at present of no more than 50°C. The gas cools through the pipeline and the arrival temperature at the Azerbaijan/Turkey border will depend on the flow rate and season of the year, and will normally be the same as the ambient ground temperature. It is expected that there will be no effect on the environment.

5.3 Project Schedule for Implementation and Development

5.3.1 Project Schedule

It is anticipated that the construction and commissioning of the system will be completed by mid/late 2018. The Project has recently completed the front-end engineering design phase.

Figure 5-4 presents the anticipated programme for design, construction and commissioning of the SCPX Project.

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<td>ESIA and land acquisition</td>
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<td>Construction facilities</td>
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<td>CSG1</td>
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<td>Construction pipeline</td>
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<td>Georgia pipeline</td>
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<td>Azerbaijan pipeline</td>
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Figure 5-4: Anticipated SCPX Project Programme

The SCPX Final ESIA for the 56” design was approved by the Azerbaijan Government in mid-2013. This SCPX ESIA Addendum, covering the updated 48” pipeline design was submitted for public disclosure in the end of March 2014. Negotiations for land acquisition will be complete by 2016.

Refer to the Final ESIA Section 5.3.1 for details on anticipated the Project schedule.

5.3.2 Project Development

The sequence of events leading up to the implementation of the SCPX Project is the same as those outlined in Section 5.3.2 of the SCPX Final ESIA.

5.3.3 Project Need and Consideration of Alternatives

The need for the extension of the 48” pipeline loop is presented in Chapter 4 of this ESIA. Various strategic alternatives have been studied and evaluated to give the most efficient, cost-effective, safe and environmentally and socially acceptable scheme to provide the increased capacity required of this pipeline delivery system.
5.3.4 Feasibility Studies and Consideration of Design/Routing Alternatives
The updated Project concept as described in Section 5.2 above represents the culmination of a process of field investigations, design and environmental assessments over a period of many months to determine the best option that meets the Project objectives. The process is ongoing and will continue until the proposed scheme is implemented. The results of key feasibility studies and alternatives are discussed in Chapter 4.

5.3.5 Basic Engineering and Environmental Scoping
The basic engineering generated a conceptual design for the whole of the SCPX Project. An integral part of that process was an assessment of the optimum length of the pipeline and the location of the associated AGI facilities. The environmental baseline surveys, risk assessments and environmental scoping that were carried out informed the conceptual design for the Project.

5.3.6 Front-end Engineering and Environmental and Social Impact Assessment
Front-end engineering started in 2011, for the initial 56” pipeline design, with additional work for the change in design to 48” diameter taking place between end of 2012 and mid-2013. To account for changes associated with pipeline design alteration, international ESIA consultants were appointed to produce this ESIA Addendum, building on scoping studies and environmental and social work undertaken during the basic engineering. The entire route of the proposed additional section of the SCPX pipeline loop has been walked and surveyed by engineers and environmental specialists, including topographical survey teams and ecologists.

As part of this ESIA Addendum, a social assessment has been undertaken to identify potential impacts and reduce potential disturbances to surrounding communities and the livelihoods of the inhabitants. Positive impacts, such as employment, are also identified and, where possible, enhanced. Stakeholders in Azerbaijan were consulted to gain local knowledge of the proposed pipeline route and the locations of the associated AGIs. This allowed for improved identification and assessment of preferred locations for the pipeline route and AGIs.

5.3.7 Project Footprint
Compared with the 56” design, the 48” pipeline envisages an additional 34km of pipeline ROW corridor. No additional permanent land area will be required for the 48” design. At the time of production of this report (June 2014), the Project has moved into detailed design phase, and as a result of the design development of pipeline arrangements at the pigging station, a requirement for an additional 20m extension and a 25m exclusion zone has been identified. The current footprint figure is estimated to be 33,861m².

Owing to the extension of the pipeline length by 34km, the temporary SCPX Project footprint will increase by approximately 1,224,000 m² from the original 13,900,000m² to 15,124,000m². The updated temporary footprint estimates are shown in Table 5-1.

Table 5-1: Preliminary Estimates of Temporary SCPX Project Footprint (34km Additional ROW)

<table>
<thead>
<tr>
<th>Location</th>
<th>Sub-total (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional Pipeline ROW</td>
<td>1,224,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,224,000</td>
</tr>
</tbody>
</table>

5.3.8 Project Land Requirements
The 'Project land' area is the total amount of land that will be acquired by the Project, but may not be directly used. Project land requirements will therefore be larger than Project footprint requirements. Land acquisition for permanent land needs is generally larger than the total permanent footprint, as additional areas have been purchased to accommodate land ownership. The 48” design does not require any facilities in addition to those...
considered in the SCPX Final ESIA and the preliminary estimate for permanent land acquisition (pigging station and block valves) is approximately 120,267m² which is a change from requirements originally stated in Section 5.3.8 of the SCPX Final ESIA due to additional area added for an exclusion zone. This land will be acquired and occupied by the Project on a permanent basis. The main change is the location of the pigging station, as it has moved to the start of the new pipeline route at SCP KP23.

Temporary, construction-related land needs for the extension (excluding the pigging station) are listed in Table 5-2, and preliminary calculations estimate approximately 1,285,152 m² of additional land will be required. There have been additional increases on the Project ROW footprint during detailed design. Therefore the total amount of land required during the construction phase of the Project will increase from the Final ESIA figure of 15,790,200m² to 17,529,878 m².

Table 5-2: Estimates of Additional 48” Project Temporary Construction Land Requirements

<table>
<thead>
<tr>
<th>Location</th>
<th>Sub-total (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land boxes for crossings</td>
<td></td>
</tr>
<tr>
<td>Road</td>
<td>20,320</td>
</tr>
<tr>
<td>Railway</td>
<td>0</td>
</tr>
<tr>
<td>River</td>
<td>0</td>
</tr>
<tr>
<td>Canal</td>
<td>8,592</td>
</tr>
<tr>
<td>Trenchless foreign service</td>
<td>32,240</td>
</tr>
<tr>
<td>Sub-total</td>
<td>61,152</td>
</tr>
<tr>
<td>Pipeline ROW (based on 36m standard working area)</td>
<td></td>
</tr>
<tr>
<td>Pipeline ROW</td>
<td>1,224,000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,285,152</td>
</tr>
</tbody>
</table>

This land will be occupied for the duration of construction of the relevant facilities, until they are no longer required (generally three years) and will typically be leased from its current owners. After construction and reinstatement are complete or at the end of the lease, land will be handed back to its owners, who will be able to resume previous utilisation (agricultural or otherwise) subject to safety zone requirements.

5.4 Project Design Basis

The Host Government Agreement (HGA) requires that the Project conform to “current technical standards and practices generally used by the international community (within Canada, the United States or Western Europe) with respect to Natural Gas pipeline projects comparable to the Project”. Project design basis, described in Section 5.4 of the SCPX Final ESIA, remains applicable to the updated 48” pipeline design, including the additional section of the SCPX pipeline. Nevertheless, due to the change in pipeline diameter from 56” to 48” and associated change in routing and facility location, there are certain alterations to the project design basis, which are described below.

5.4.1 Design Codes and Standards

The design codes and standards for the 48” design remain largely the same as those outlined in Section 5.4.1 of the SCPX Final ESIA. However, the wall thickness of the 48” pipeline will change, as outlined below.
5.4.1.1 **Pipeline diameter and materials**

The 48” pipeline will comprise X70 grade line pipe with a nominal 16.7mm wall thickness where the route crosses agricultural land. Increased wall thickness is specified where the pipeline route passes through lightly populated areas (20.1 mm) or densely populated areas (24.1mm). Where there is a high risk of damage to or interference with the pipeline, the pipe wall thickness may be further increased.

An increased wall thickness with a design factor of 0.6 will be applied at road, railway and river crossings to meet the requirements of API RP 1102 (D5-034) ‘Steel Pipelines Crossing Railroads and Highways’.

A wide range of other international codes and standards are also identified and these shall be applied, where appropriate, to specific elements of the Project design.

5.4.2 **Design Life**

The design life for the 48” pipeline is the same as those outlined in Section 5.4.2 of the SCPX Final ESIA.

5.4.3 **Design Safety Factors**

Safety factors, defined in the SCPX Final ESIA, are applicable to the updated 48” design. A 0.72 design factor will be applied to the majority of the pipeline route, whereas safety factors 0.6 and 0.5 have been incorporated into the design to reflect key sensitivities, including environmental and social conditions (see Section 5.4.3 of the SCPX Final ESIA).

5.4.4 **Pipeline Diameter and Materials**

The SCPX line pipe will be formed of continuously welded, high-grade API 5L Grade X70 carbon steel with an outside diameter of 48 inches (1219mm).

5.4.5 **Design Pressures and Temperatures**

The design pressures and temperatures for the 48” pipeline remain the same as those outlined in Section 5.4.5 of the SCPX Final ESIA.

5.4.6 **Corrosion Protection**

Corrosion protection for the 48” pipeline remains the same outlined in Section 5.4.6 of the SCPX Final ESIA.

The pipeline is protected via cathodic protection (CP), which takes the current from the pipe to the ground. The CP consists of a copper cable clamped to the end of each length of pipe string and connected to earthing rods with are approximately a metre from the pipeline. The earthing rods are positioned underneath or parallel to powerlines.

5.4.7 **SCPX Pipeline Route**

The updated 48” pipeline route has undergone a series of re-routes to take account of social, engineering, geotechnical and environmental constraints. The updated route selection process and the alternatives considered are described in Chapter 4, Project Alternatives. Where possible the proposed SCPX pipeline will be constructed either adjacent to or in the same corridor as the existing SCP pipeline as stated in Section 5.4.7 of the Final ESIA.

The updated pipeline route highlights a mud volcano ridge area at SCP KP 23-29, which includes a section of ridges with steep slopes between SCP KP24 and KP28. The original BTC/SCP pipelines were installed at reduced centreline separation along the top of a narrow ridge from SCP KP 26.5 to SCP KP 27.7. Field surveys have identified that there is insufficient width along this section for construction of the SCPX pipeline. A new route has been identified along another ridge line, starting at approximately 300m from SCP KP 26.5 and terminating 100m from SCP KP 27.7 (Figure 5-5). The SCPX deviation along the
additional ridge starts at SCP KP 25.6, and re-joins at SCP KP 27.7, thus establishing the shortest feasible re-route for this pipeline section.

---

**Figure 5-5. SCPX Pipeline Route in the Mud Volcano Ridge Area**

Where the updated 48" SCPX pipeline crosses buried services or pipelines, trenchless or open-cut crossing methods will be adopted, which is described in the section 5.4.7 of the Final ESIA.

### 5.4.8 Intermediate Compressor and Metering Stations (Georgia)

This section on Georgian infrastructure remains the same as the Final ESIA 5.4.8. Further information is available in the SCPX Final ESIA (Georgia).

### 5.4.9 Intermediate Pigging Facility

For a description on pipeline integrity gauge (PIG) please see Section 5.4.9 of the Final ESIA.

The SCPX has been designed to facilitate the use of cleaning and inspection pigs. According to the 48" design, a pig-launching facility for the SCPX will be constructed at SCP KP23 instead of SCP KP57. Furthermore, as indicated in Section 5.3 above, the pigging station layout has been slightly extended following detailed design development of pipeline arrangements.

The pigging station power supply has been revised from the use of approximately eight thermal electric generator (TEG) units, with an individual output of approximately 0.55kW to the use of diesel generators. The change from thermo electric to diesel generators was a result of a technical and safety review. To avoid a potential issue during operations with the high pressure- low pressure interface and fuel gas pressure reduction skid, the best outcome would be to change to diesel generators. As a result of the change, the diesel generators will operate on a short term basis only, powering the battery.
This will result in less emissions being produced during operations as compared to the running of thermo electric generators.

The new pigging station will have two diesel generators operating on a short-term basis only, recharging the batteries to power the local equipment rooms. The generators will be sized at approximately 10kW and the operating generator is expected to run for a maximum of 50% of the time. The pigging station will also be equipped with the provision for a future grid connection. The diesel system will also include a diesel tank (approximately 55 litres) and a diesel pump.

The use of diesel generators leads to a reduction in fuel consumption and associated emissions. Apart from the change in location and change to use of diesel generators the characteristics of the pigging facility remain as described in Section 5.4.9 of the SCPX Final ESIA.

### 5.4.10 Block Valve Stations
For a description on block valves (BVRs), please see Section 5.4.10 of the Final ESIA.

There will be five BVRs along the Azerbaijan section of the SCPX route, as discussed in Section 5.4.10 of the SCPX Final ESIA. None of the BVRs will be located on the additional section of the SCPX pipeline. However, owing to the change to a 48"-diameter pipeline, the BVR locations have been updated and are shown in Table 5-3.

<table>
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<tr>
<th>SCPX KP</th>
<th>Block Valve Number</th>
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<tr>
<td>55</td>
<td>BVR A6</td>
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<tr>
<td>129</td>
<td>BVR A7</td>
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<tr>
<td>206</td>
<td>BVR A8</td>
</tr>
<tr>
<td>277</td>
<td>BVR A9</td>
</tr>
<tr>
<td>368</td>
<td>BVR A10</td>
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### 5.4.11 Integrated Control and Safety System
The existing integrated control and safety system (ICSS) will be upgraded and expanded to cover the SCPX and facilities, see Section 5.4.11 of the SCPX Final ESIA.

### 5.4.12 Cathodic Protection
The wall thickness of the pipe is determined by operating pressure considerations while applying the specified 0.72 design factor. In areas of particular environmental or social risk, where an increase safety factor applies (see Section 5.4.3), the wall thickness will increase from 16.7mm for a design factor of 0.72 to 20.1mm for a design factor of 0.6, and increasing up to a maximum of 24.1mm for a design factor of 0.5.

### 5.5 Project Construction
The Project approach to pipeline construction will remain largely unchanged as a result of the Project design updates; any changes have been outlined below. Refer to Section 5.5 of the SCPX Final ESIA for information relating to the following:

- Pipeline construction camps
- Pipe yards
- Land acquisition
- Surface preparation and grading
- Pipe stringing
• Trenching
• Pipeline installation
• Crossing of linear features
• Fault crossing
• Construction of pipeline AGIs.

5.5.1 **Construction Overview**

The construction overview for the 48” pipeline remains the same as those outlined in Section 5.5.1 of the SCPX Final ESIA.

5.5.2 **Construction Workforce**

Project manpower estimates are described in Section 5.5.2 of the SCPX Final ESIA. It is envisaged that no extra direct or indirect personnel will be required for the construction of the updated SCPX pipeline Project.

5.5.3 **Construction Camps and Pipe Storage Areas**

Details of the proposed construction camps and pipe storage areas remain the same as outlined in Section 5.5.3 of the SCPX Final ESIA.

5.5.4 **Access Roads and Tracks**

The pigging station will require a permanent access road; there are a number of existing tracks linking the main public access road with the proposed pigging station that could potentially be used. The Project intends to use the access road outlined in Figure 5-6, this is the road that has been assessed as part of this Addendum.

Details relating to access roads and tracks, including the pigging station access road, remain the same as outlined in Section 5.5.4 of the SCPX Final ESIA.
Figure 5-6: Pigging Station and Associated Access Road
5.5.5 **Pipe and Equipment Transport to the ROW**

An important aspect of the construction process is the transport of pipe sections, plant and other equipment to the construction areas, dedicated storage areas and construction camps. Line pipe delivery will represent the majority of movements associated with the construction phase in Azerbaijan. The total number of 48" pipe lengths required is 35,056 pipes. This increases the total number of pipes from the Final ESIA from 32,300 56 "pipe lengths at 12.2m each to approximately 35,056, 48" pipe lengths at 12.2m each.

It is anticipated that the 48" Class 1 pipes will be transported three pipes per truck (the majority of pipe is Class 1 at 91%), Class 2 and Class 3 pipes are transported two pipes per truck (the percentage of each is 5% and 4% respectively). The total number of 48" pipe lengths required for the entire pipeline route is 35,056 and the number of vehicle journeys required for the transportation of these pipe lengths is 12,503 journeys. Of which 2787 pipe lengths is associated with the extra 34km pipeline loop. The number of vehicle movements required for the extra 34km pipe is 971 journeys. The total vehicle journey number reveals a decrease from the Final ESIA figure for the 56" pipe lengths of 16,150 for the 56" pipe to 12,503 for the 48" pipe; this is due to the majority of the 56" pipes being transported two pipes per truck.

A more detailed description of the pipe and equipment transportation can be found in Section 5.5.5 of the SCPX Final ESIA.

5.5.6 **Pipeline Construction Plant**

Details relating pipeline construction plant remain the same as outlined in Section 5.5.6 of the SCPX Final ESIA.

5.5.7 **Preparation of the Pipeline Loop ROW**

The preparation of the pipeline loop ROW will remain the same as outlined in Section 5.5.7. The indicative layout of the construction ROW for the 48" pipeline is illustrated in Figure 5-6.
Figure 5-7: Indicative Layout of Construction Right of Way
5.5.8 **Pipeline Installation**

Pipeline installation remains the same as outlined in Section 5.5.8 of the SCPX Final ESIA.

5.6 **Crossings of Linear Features**

Crossings are defined as the intersection between the proposed route and pre-existing features such as:

- Rivers, stream, irrigation channels and canals
- Public roads and tracks
- Rail tracks
- Underground foreign services.

The numbers of additional crossings required for the extra 34km of pipeline are given in Table 5-4 against the different features. There are 13 additional canal crossings, of which the Pirsaat\(^1\) canal is the most notable canal crossing, there are also 4 road crossings associated with the proposed additional 34km of the SCPX pipeline.

### Table 5-4: Number of Different Crossing Types Crossed by Additional 34km SCPX Pipeline Route

<table>
<thead>
<tr>
<th>Crossing Type</th>
<th>Number of Crossings</th>
<th>KP point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seismic Fault</td>
<td>3</td>
<td>KP1 (mud volcano), KP26, KP27</td>
</tr>
<tr>
<td>Track</td>
<td>51</td>
<td>KP0.2, KP1.7, KP2, KP5, KP6, KP8 (3 crossings), KP9, KP10, KP11, KP12 (3 crossings), KP13 (4 crossings), KP14 (3 crossings), KP16, KP17 (3 crossings), KP18 (5 crossings), KP19 (2 crossings), KP20, KP21 (2 crossings), KP23 (2 crossings), KP24, KP25, KP26 (2 crossings), KP27 (3 crossings), KP29, KP31, KP32 (2 crossings), KP33 (2 crossings), KP34</td>
</tr>
<tr>
<td>Ditch</td>
<td>27</td>
<td>KP0.4, KP5, KP10, KP11 (2 crossings), KP12 (5 crossings), KP13 (3 crossings), KP14 (2 crossings), KP15 (2 crossings), KP16 (2 crossings), KP17 (2 crossings), KP18, KP22, KP24, KP29, KP30, KP33</td>
</tr>
<tr>
<td>Stream</td>
<td>9</td>
<td>KP22 (3 crossings), KP25 (2 crossings), KP26, KP31 (3 crossings)</td>
</tr>
<tr>
<td>Underground pipe or cable</td>
<td>31</td>
<td>KP8 (9 crossings), KP23 (5 crossings), KP27 (2 crossings), KP28 (5 crossings), KP29 (9 crossings), KP33</td>
</tr>
<tr>
<td>Overhead cable</td>
<td>10</td>
<td>KP16 (2 crossings), KP18 (2 crossings), KP27, KP28 (3 crossings), KP29 (2 crossings)</td>
</tr>
<tr>
<td>Canal</td>
<td>13</td>
<td>KP7 (2 crossings), KP8, KP12, KP16 (4 crossings), KP17 (2 crossings), KP18 (2 crossings including Pirsaat Canal), KP27</td>
</tr>
<tr>
<td>Road</td>
<td>4</td>
<td>KP16, KP18 (Asphalt), KP20, KP28</td>
</tr>
<tr>
<td>Aboveground pipe or cable</td>
<td>2</td>
<td>KP16, KP28</td>
</tr>
<tr>
<td>Trench</td>
<td>1</td>
<td>KP23</td>
</tr>
<tr>
<td>Channel</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Major river or canal</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Gully</td>
<td>2</td>
<td>KP1, KP27</td>
</tr>
<tr>
<td>Railway</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Marsh or pond</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

\(^1\) Pirsaat River is canalised at the point of crossing with the proposed SCPX pipeline and therefore is classed as canal for the purposed of this ESIA Addendum.
Crossing techniques for each of the above are discussed in Section 5.6 of the SCPX Final ESIA.

With respect to crossings, watercourses include canals, aqueducts, irrigation channels, drainage ditches and natural streams and rivers.

Watercourse crossings for the additional section of pipeline, including the Pirsaat river crossing, will be constructed using conventional open-cut (OC) methodologies as outlined in Section 5.6.1 of the SCPX Final ESIA.

Updated typical crossing diagrams for three crossing types – preliminary typical open-cut road crossing (Figure 5-7), preliminary typical open-cut crossing (not trenchless) (Figure 5-8) and preliminary typical trenchless crossing (not open-cut) (Figure 5-9) – are included below and replace Figures 5-14, 5-15 and 5-16 from the SCPX Final ESIA.
5.7 Fault Crossing

There are three fault crossings on the additional section of pipeline: SCPX KP1, SCPX KP 26 and SCPX KP27. The section of the pipeline trench that crosses the faults will be excavated in a trapezoidal shape, lined with geotextile membrane and filled with non-cohesive, graded aggregate (D5-006). This will allow free and unrestricted movement of the pipe with the ground surface during a potential seismic event and avoid causing a rupture. Figure 5-10 illustrates an updated fault crossing design.
Figure 5-11: Updated Fault Crossing Design
5.8 Project Commissioning

5.8.1 Commissioning of Facilities
The commissioning of facilities remains the same as outlined in Section 5.7.1 of the SCPX Final ESIA.

5.8.2 Pipeline Hydrostatic Testing

5.8.2.1 Testing procedures
The additional section of the 48” SCPX pipeline will be hydrotested to ensure that it is free from material defects and is suitable for the containment of hydrocarbon gas at the design operating pressure. The testing procedure is outlined in Section 5.7.2.1 of the SCPX Final ESIA.

5.8.2.2 Hydrotest water supply

For the proposed additional section of the SCPX pipeline, hydrotest water supply will be arranged in the same way as outlined in Section 5.7.2.2 of the SCPX Final ESIA. It is anticipated that due to the limited availability of water sources along the route and the quantity of water required, the construction contractor will “push” the water along to the next consecutive test section. This would result in multiple test sections being tested and then connected before finally being dried.

Hydrotest water will be abstracted from surface water bodies located in close proximity to the ROW. In relation to the proposed additional section of the SCPX pipeline, the hydrotest water is likely to be abstracted from the Pirsaat Canal.

Pipeline diameter decrease from 56” to 48” will result in lower hydrotest water requirement. The total maximum volume of water likely to be required for the SCPX Project in Azerbaijan, for both pipeline testing and HDD and micro-tunnel testing, is approximately 547,800m³. However, the total volume of the 48” pipeline is approximately 466,400m³, and this volume is not likely to be exceeded for pipeline testing, meaning the 700,000m³ total represented in Table 5-5 is unlikely to be reached.

Table 5-5: Hydrotest Abstraction Points and Maximum Abstraction Volumes

<table>
<thead>
<tr>
<th>Watercourse</th>
<th>Maximum volume required for testing pipeline (m³)</th>
<th>Maximum volume required for HDD and microtunnel testing and working (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pirsaat Canal</td>
<td>100,000</td>
<td>0</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100,000</td>
<td>0</td>
</tr>
</tbody>
</table>

5.8.3 Drying and Lay Up
Following hydrostatic testing, the water left in the pipeline will be removed by pigging and disposed of appropriately, using a method that will first be agreed with the Azerbaijani regulators. Following successful pigging of the pipeline it will be dried prior to commissioning. Drying methods which are likely to be applied to the SCPX pipeline, including the proposed additional section, are described in Section 5.7.3 of the SCPX Final ESIA.

5.8.4 Pre-commissioning
Pre-commissioning of the pipeline, pigging station and block valves will remain the same as outlined in Section 5.7.4 of the SCPX Final ESIA.
5.8.5 Commissioning
Commissioning of the pipeline and block valves will remain the same as outlined in Section 5.7.5 of the SCPX Final ESIA.

5.9 Reinstatement and Erosion Control
Reinstatement and erosion control will remain the same as outlined in Section 5.8 of the SCPX Final ESIA.

5.10 Project Operation and Maintenance

5.10.1 General
An environmental and social management system will be developed to maintain compliance with the ESIA during operations. This is described further in Chapter 13, and as far as practicable this system will be integrated into the existing SCP management systems.

5.11 Project Resources, Wastes and Emissions
Construction of the proposed additional section of the SCPX pipeline will result in alteration of the total estimates of resources, wastes and emissions, details of which have been outlined below.

5.11.1 Labour
Labour will remain the same as outlined in Section 5.10 of the SCPX Final ESIA.

5.11.2 Operation
Operation will remain the same as outlined in Section 5.10 of the SCPX Final ESIA.

5.11.3 Construction Equipment
Construction equipment will remain the same as outlined in Section 5.10 of the SCPX Final ESIA.

5.11.4 Construction Materials
Estimates for consumption of construction materials associated with the new 48”-diameter pipeline are presented in Table 5-6.

Table 5-6: Estimated Resource Requirements for Updated 48” Project

<table>
<thead>
<tr>
<th>Resource Type</th>
<th>Estimated Amount</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line pipe (Class 1,2,3)</td>
<td>256,000</td>
<td>Metric tonnes</td>
</tr>
<tr>
<td>Aggregates (sand and gravel)</td>
<td>65,000</td>
<td>m³</td>
</tr>
<tr>
<td>Concrete</td>
<td>19,001</td>
<td>m³</td>
</tr>
<tr>
<td>Asphalt/tarmac</td>
<td>Minimal</td>
<td>m²</td>
</tr>
<tr>
<td>Timber</td>
<td>1627</td>
<td>m³</td>
</tr>
<tr>
<td>Fuel/diesel</td>
<td>92,720</td>
<td>m³</td>
</tr>
<tr>
<td>Structural steel (temporary facilities)</td>
<td>5</td>
<td>Metric tonnes</td>
</tr>
<tr>
<td>Fibre-optic cable</td>
<td>759</td>
<td>Metres</td>
</tr>
<tr>
<td>Power cable</td>
<td>1627</td>
<td>Metres</td>
</tr>
<tr>
<td>Copper cable (1mm CSA)</td>
<td>2.2</td>
<td>Kilometres</td>
</tr>
</tbody>
</table>

5.11.5 Energy
Details relating to the energy requirements of the Project remain the same as outlined in Section 5.10.2 of the SCPX Final ESIA.
5.11.6 **Water**

Section 5.10 of the SCPX Final ESIA remains unchanged, with the exception of the volume of water required for hydrotecting. The maximum theoretical volume of pipeline hydrotect water would be equal to the entire capacity of the SCPX pipeline in Azerbaijan, i.e. approximately 466,400m³. In addition, approximately 81,400m³ of water is also likely to be required for HDD and micro-tunnel testing. Where possible hydrotect water will be reused, which will reduce the total volume required.

5.11.7 **Wastes and Emissions**

Details relating to wastes and emissions associated with the Project remain the same as outlined in Sections 5.6 and 5.10 of the SCPX Final ESIA, with the exception of the Project waste arisings (Table 5-7) and Project emissions (Table 5-8 and Table 5-9).

**Table 5-7: Projected Waste Arisings (metric tonnes)**

<table>
<thead>
<tr>
<th>Waste category</th>
<th>Total (Tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sludge</td>
<td>199</td>
</tr>
<tr>
<td>Post biological treatment at STPs</td>
<td></td>
</tr>
<tr>
<td>Hazardous</td>
<td></td>
</tr>
<tr>
<td>Used oil, used oily filters, hydrocarbon contaminated material (rags, drums, soil, used spill response equipment), paint and solvents, batteries (dry-cell/lead)</td>
<td>17</td>
</tr>
<tr>
<td>Used drums (chemical cans, drums, containers, packages should be treated and disposed as hazardous waste if their content was defined as hazardous material.)</td>
<td></td>
</tr>
<tr>
<td>Any other waste process chemicals, fluorescent tubes, contaminated soil</td>
<td></td>
</tr>
<tr>
<td>Non-hazardous</td>
<td></td>
</tr>
<tr>
<td>Rubber tyres, glass, paper, cardboard, plastics, scrap metals, wood, general (domestic) waste, grit blast</td>
<td>437</td>
</tr>
<tr>
<td>Inerts</td>
<td></td>
</tr>
<tr>
<td>Soil, sub-soil, stones and gravel</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>656</td>
</tr>
</tbody>
</table>

As stated previously in Section 5.5.5 the majority of the 48” pipes will be transported three pipes per truck which leads to a reduction of 3647 journeys compared with the 56” pipe (transported two pipes per truck). This leads to a reduction in fuel consumption of 29 tonnes, and a fall in CO₂ emissions of 88.64 tonnes, this specifically related to pipe transportation.

However, due to the addition of an extra 34km to the pipeline length, the amount of time that both non-road equipment and other road vehicles are to be used will also increase, therefore increasing the overall emissions as a result. This has been calculated based on the additional length and the results have been populated in the table below.

**Table 5-8: Assessment of Combustion Emissions Pro-rated based on Addition of 34km Pipeline**

<table>
<thead>
<tr>
<th>Source type</th>
<th>Emissions (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HC</td>
</tr>
<tr>
<td>56” pipeline (stated in Final ESIA)</td>
<td></td>
</tr>
<tr>
<td>Non-road construction equipment</td>
<td>466</td>
</tr>
</tbody>
</table>
Source type | Emissions (tonnes) | HC | CO | NO$_x$ | PM | CO$_2$ | SO$_2$
---|---|---|---|---|---|---|---
Road vehicles | - | 44 | 114 | 10 | 10,154 | -

48" pipeline (pro-rated based on a 11.5% increase in pipeline length)

Non-road construction equipment | 54 | 298 | 394 | 51 | 35,355 | 36
Road vehicles | - | 5 | 12 | 1 | 1,079 | -
TOTAL (Includes reduction in CO$_2$ from pipe transportation) | 520 | 2,941 | 3,950 | 509 | 354,021 | 346

Notes: Vehicles and equipment were categorised according to available emission factors in the US EPS's Non-road Engine and Vehicle Emission Study (NEVES). NEVES lists the average horse power ratings and pollutant emissions factors for each of the equipment. Every unit has been assumed to operate for 10 hours per day, every day for the duration of 31 months construction period, at total of 9720 hours (estimated).

Table 5-9: Preliminary Annual Operation CO$_{2eq}$ Emissions at the Block Valves and Pigging Station

<table>
<thead>
<tr>
<th>Facility</th>
<th>Fugitive emissions (tonnes)</th>
<th>Operation emissions (tonnes)</th>
<th>Total (tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pigging station</td>
<td>28</td>
<td>348</td>
<td>376</td>
</tr>
<tr>
<td>Block valve stations</td>
<td>94</td>
<td>0.33</td>
<td>94</td>
</tr>
<tr>
<td>Pipeline</td>
<td>70</td>
<td>n/a</td>
<td>70</td>
</tr>
<tr>
<td>Total (tonnes)</td>
<td>192</td>
<td>348.33</td>
<td>540</td>
</tr>
</tbody>
</table>

5.12 Decommissioning and Abandonment Plans

Proposed additional section of the SCPX pipeline will be subject to the same decommissioning and abandonment arrangements as the rest of the SCPX pipeline, see Section 5.11 of the SCPX Final ESIA.

5.13 Conclusion

This chapter has updated where applicable the information on the activities proposed to be carried out for the Project, associated with the pipeline diameter alteration from 56" to 48" and additional pipeline section.

The aspects of the Project as described here that can impact on the environmental and socio-economic conditions are identified and assessed in Section 10 and 12 of the ESIA.