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11 CUMULATIVE AND TRANSBOUNDARY IMPACTS

11.1 Introduction

This chapter presents the assessment of two types of potential cumulative impact that may result from the SCPX Project. These impacts are generally known as “additive” and “in-combination”, and are defined in the paragraphs below.

Additive impacts are those 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) with the construction and operational phases of the proposed SCPX Project (to the extent that these are known at the date of this report). While a single activity may itself result in an insignificant impact, it may, when combined with other impacts (significant or insignificant) in the same geographical area and occurring at the same time, result in a cumulative impact that is significant. Projects which have the potential to produce cumulative impacts with SCPX are described in Section 11.3.

In-combination impacts occur where different types of impact from the project being considered are likely to affect the same environmental or socio-economic features. 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.

Chapter 10 has already considered the cumulative (or additive) impacts of the proposed SCPX Project with existing developments such as the BTC/SCP and WREP pipelines, as they are part of the existing baseline environment.

This chapter also provides an assessment of the potential for transboundary impacts resulting from the SCPX Project. It assesses the potential for the Project’s significant environmental and social impacts to extend beyond the borders of Azerbaijan and affect sensitive receptors in other countries.

11.2 Temporal and Spatial Boundaries

The cumulative effects of the Project are considered at a national and local level, while the transboundary effects of the Project are considered at an international level.

11.2.1 Cumulative

National level: Impacts from other proposed projects could utilise different pathways to the same sensitive receptors in Azerbaijan that may be affected by the proposed SCPX Project.

Local level: Cumulative effects are considered most likely to occur in the SCPX Project area as follows:

- Areas of steep slopes and thin erosion prone soils where ROW restoration is more challenging
- Areas of fragile habitat where biorecovery can take a considerable time to achieve
- Areas of protected flora and fauna sensitive to disturbance (e.g. *Iris camillae* where translocation to an area off the ROW is proposed as mitigation)
- Areas proposed to be used for construction work where cultural heritage could be disturbed:
 - The 36m-wide ROW of the proposed SCPX pipeline from the pigging station (KP0) to the Azerbaijan/Georgia border (KP390)
 - Construction camps and pipe storage yards

- Access roads
- Pigging station and block valves
- Project-affected people (PAP) where land use and livelihood may be affected
- The area up to approximately 300m from the pipeline and the facilities in which dust from construction work can settle
- Areas around the construction camps and pipe storage yards where local communities may experience increased traffic movements, noise, dust and local air quality degradation (particularly if mobile incinerators are used)
- The areas where construction noise may be audible (up to approximately 400m from the pipeline ROW and within a similar distance of the facility construction sites)
- Pipeline river crossings where flow and erosion/deposition regime may be altered by the installation of hard bank reinforcement measures to prevent erosion
- Areas where local air quality may be degraded both during construction and operation (in operation this will be minimal and limited to operation of the pigging station)
- Areas where operational noise may be audible (which is expected to be minimal and limited to the operation of the pigging station)
- Project-affected communities (PACs)
- Roads, railways and ports, that will be used by SCPX logistics and construction traffic.

Temporal: The temporal boundary of the assessment has been set to include the period during which the construction work is proposed to be carried out and the period during which biorestitution of all parts of the ROW would then become effective. This is considered to be a period of approximately 10+ years in fragile semi-desert areas and areas where slopes are highly susceptible to erosion. Operational impacts have been considered during the Project design life of 30 years.

Pre-construction mobilisation in Azerbaijan is proposed to be scheduled for late 2014 with early works to prepare access roads, construction camps and lay-down areas also commencing in late 2014. It is estimated that the pipeline construction period in Azerbaijan would commence in mid-2015 for the first section (SCPX KP0–KP235) and is likely to be complete by late 2017. Construction of the second section (KP235 to KP389) is proposed to be scheduled to begin in April 2016 and is likely to be complete in the second half of 2017. Commissioning is proposed to be scheduled to commence at the end of 2017, with system start up and normal operation scheduled for the beginning of 2018.

11.2.2 Transboundary

International level: Transboundary effects relate to pathways by which contaminants could be transported to sensitive receptors located in Georgia, Armenia and the Caspian (and therefore the Caspian littoral countries of Russia, Kazakhstan, Turkmenistan and Iran). In practice, for the SCPX Project this is likely to be limited to the transfer of atmospheric pollutants by winds blowing across the national borders, and potential contaminants that may affect the water quality in the Kura River that flows from Azerbaijan to the Caspian. There may be some transboundary migration of labour between Azerbaijan and Georgia but this is considered likely to be very limited.

11.3 Other Projects

This section identifies developments that may interact, or whose impacts are considered likely to interact, with the SCPX Project either during construction or during operations. Projects that may happen at some date in the future but for which there are no clearly defined proposals in the public domain have not been included.

11.3.1 Cumulative Developments in the Project Area

Azerbaijan has experienced a sustained surge in construction activity in the last five to ten years, as revenue from oil and gas sales via the BTC and SCP pipelines has been received. Significant investment in infrastructure has been provided, via both government and international funding (such as European Bank for Reconstruction and Development (EBRD) and World Bank).

In order to obtain information on potential future projects which may have a cumulative interaction with the proposed SCPX Project, research (via internet) and consultation with organisations and government bodies in Azerbaijan was undertaken. Responses were received from the following organisations:

- Ministry of Environment and Natural Resources (MENR)
- State Oil Company of the Azerbaijan Republic (SOCAR)
- Ministry of Agriculture
- Ministry of Communications and Information Technologies
- Ministry of Industry and Energy
- Ministry of Transport
- State Committee on Statistics
- Azerbaijan Melioration and Water Industry Open Joint-Stock Company
- Regional Executive Committees along the proposed SCPX route (Tovuz, Yevlakh)
- Gobustan Operating Company
- Petro-Hong Kong – Pirsaat Oil Limited.

The responses received were reviewed together with the results of the internet research, and a number of major development proposals were identified which, due to their proximity, scale and timeframe have the potential to generate cumulative effects when considered together with the proposed SCPX Project.

Information on the timescales for the proposed developments has been included in this chapter where it has been made available. Where such information is unavailable, professional judgment has been applied as to the likelihood of construction or operation being concurrent with the construction/operation of the proposed SCPX Project. The following section details the projects that have been identified during the research and consultation process and discuss which of those is considered as most likely to have a cumulative interaction with the proposed SCPX Project. Those projects are then discussed further in Section 11.4, Assessment of Additive Impacts.

In addition to the development proposals identified in this chapter, there are likely to be a number of other (as yet undefined) projects that may be undertaken in the proposed SCPX Project area.

11.3.2 Oil and Gas Pipelines

It is proposed to build the SCPX pipeline mostly in the same pipeline corridor through Azerbaijan that has been used by the existing BTC and WREP oil pipelines and the SCP gas pipeline. There are certain areas where the route of these pipelines is also shared by other third-party pipelines such as the Azeri gas pipeline, which runs from near Baku to the Georgian border. SCPX is proposed to run approximately parallel to the BTC and SCP pipelines. Therefore, along much of the SCPX pipeline route the soil has been disturbed by these previous pipeline projects; in some areas reinstatement of the existing pipelines ROW is sparse and patchy, particularly in areas of thin soil and steep slopes, which are prone to erosion. The cumulative (or additive) impacts associated with the interactions between the existing pipelines and the proposed SCPX Project have already been discussed in Chapter 10 for visual impact, erosion, soils and ecology as the changes as a result of the existing pipelines altered the baseline on which the impacts of SCPX have been considered.

Many long-term PAC residents are considered likely to have greater awareness and previous experience of the increased traffic movements, noise and dust that pipeline

construction entails, as a result of having experienced the impacts of existing pipeline works.

Consultation has indicated that in the Tovuz and Yevlakh regions, there is an ongoing programme to upgrade the gas lines in some of the PACs along the SCPX route. It is however anticipated that the projects in both regions will be completed before commencement of the proposed SCPX construction.

In terms of future activities that may interact with the proposed SCPX Project (and are therefore considered in this chapter), maintenance activities at various locations along the existing BTC, SCP and WREP pipelines may produce cumulative impacts. These activities are generally limited to ROW erosion control, bioremediation including periodic reseeding, and installation of additional river crossing erosion control/reinforcement measures. However, it is expected that maintenance activities related to the existing pipelines will be limited and, when added to the impacts identified in Chapter 10, are unlikely to increase the magnitude of effects identified for the SCPX Project alone. There may be potential for cumulative impacts at the Kura river crossing with the WREP sectional replacement project works if activities such as installation of additional river crossing erosion control/reinforcement measures are required.

11.3.3 Road Developments

A major nationwide road-building programme began in Azerbaijan in 2006, with a number of projects already completed and a number of others expected to be complete before the construction of the proposed SCPX Project commences. Several road-building/road upgrading projects, however, are expected to be underway during the proposed construction of the SCPX Project (2014–2017), as listed below. Where these projects are located in close proximity to the SCPX Project there is potential for cumulative impacts.

- Azerbaijan Second Highway Project (Highway 2 Project), comprising upgrading sections of the M3 highway between Alat and Masalli and rehabilitation of the M4 Baku–Shamakhi road, M2 Kurdemir–Ujar, R6 Tagiyev–Sahil, M6 Hajigabul–Bahramtapa and key access roads. Construction of this project has commenced and is expected to be complete by early 2014. Of these roads, the M2 Kurdemir–Ujar is nearest to the SCPX Project area and has the potential to have some degree of cumulative impact with the early works planned for the SCPX Project in late 2014.
- Azerbaijan Motorway Improvement and Development (Highway 3 Project), comprising the widening of a 100km section (between Baku and Tbilisi) of the existing two lane M4 Baku–Shamakhi road into four-lane motorway and related road safety activities. Construction of this project has commenced and completion is expected by early 2015. The Baku to Shamakhi section of the road, however, is not within the area of influence of the proposed SCPX Project and therefore there are unlikely to be cumulative impacts.
- A four-lane expansion of the M2 Baku–Alat–Gazakh–Georgian Republic road is planned, which will involve bypassing certain towns and cities, including Shamkir. The planned route of the Shamkir bypass has been provided by the Ministry of Transport, and it passes in close proximity (within 200m) of the proposed SCPX pipeline in the area of Dallyar Dashbulak (KP287–289). The construction of this bypass is currently scheduled to be completed before the end of 2017. This programme therefore overlaps with the proposed SCPX project and as such there is the potential for significant cumulative impacts, which have been discussed in the following sections.
- Roads Reconstruction and Upgrading Project: upgrading selected sections of the principal roads in Azerbaijan. This project will be implemented in three separate tranches including rehabilitation of the 156km Mingechevir–Bahramtapa Road (R18). This project will affect some of the area impacted by the proposed SCPX Project. This project is being funded by EBRD, although dates for commencement are not yet known.

11.3.4 Railway Developments

An existing main railway line runs from Baku through Azerbaijan and across Georgia via Tbilisi. This railway line is used as a main freight export route and runs largely parallel to the proposed SCPX route, passing through Mugan, Kurdemir, Ganja and Yevlakh before it reaches the Georgian border. A considerable quantity of oil from Azerbaijan is exported by rail via this route.

In 2007, Azerbaijan, Georgia and Turkey agreed the Kars–Tbilisi–Baku Railway Project that will directly connect Turkey, Georgia and Azerbaijan and will include upgrades to existing rail track in Azerbaijan. Construction is expected to be complete by 2013, with operation commencing in late 2013. When the project is completed it will have the capacity to carry up to 15 million tons of freight per year. Assuming the railway project is complete before the construction of the SCPX Project begins, the SCPX Project may benefit by using sections of the upgraded track to deliver line pipe and process equipment. However, if the project is delayed further (originally delivery was proposed for 2012), there may be significant impact to pipe delivery for the proposed SCPX Project, as it is understood that certain sections of track will be closed while the upgrade is taking place. Furthermore, if construction were delayed to the extent that it takes place at a similar time to the proposed SCPX Project, there would be the potential for significant cumulative impacts in terms of traffic movements, aggregates usage, batching plants, noise, dust and vibration affecting PACs. The discussion of cumulative impacts in the following sections assumes, however, that the construction schedule remains as anticipated and that construction will be complete prior to the proposed SCPX Project.

11.3.5 Irrigation Systems

A number of projects are proposed within the regions crossed by the proposed SCPX Project, which involve the repair and reinstatement of agricultural water supply and drainage systems. Such projects include:

- The “West-East Development Project” which covers the Gazakh, Agstafa and Tovuz Regions, and is likely to be implemented between 2012 and 2018
- The Integrated Rural Development Project” which covers the Yevlakh Region, and is likely to be implemented between 2012 and 2018.

Due to the timing of these projects, there may be cumulative impacts with the proposed SCPX Project.

11.3.6 Fibre Optic Cable

Aztekom is planning to implement a project to install an 86km fibre optic cable between Hajigabul and Kurdemir. Details of the timescale of this project remain unknown at this stage, however if construction is undertaken at a similar time to the proposed SCPX Project, there may be cumulative impacts in this region.

11.3.7 Agricultural Improvement Projects

A number of agricultural improvement projects are being undertaken in the regions crossed by the proposed SCPX Project. These include provision of modern technology and machinery which would be manufactured locally. A World Bank funded project, the “Second Azerbaijan Rural Investment Project” will implement infrastructure and small-scale social projects within communities crossed by the proposed SCPX Project between 2012 and 2017. This could have a positive cumulative impact within the communities in terms of livelihoods and skills, however it is not yet known in which communities this will be implemented.

11.3.8 Water Supply and Sewerage System Upgrades

A number of projects will be implemented in the areas (in particular Tovuz and Yevlakh regions) crossed by the proposed SCPX Project which involve repair and upgrade to urban water supply and sewage pipelines and construction of sewage treatment plants.

A drinking water supply pipeline will be constructed in the Yevlakh area from the Mingechevir reservoir to supply two reservoirs of 5000m² capacity close to the Karabakh Canal. A new main water supply pipeline will be constructed from the reservoirs to Yevlakh town, running parallel to the main east-west highway and passing within 1-2.5 km of the SCPX route corridor. This project is anticipated to be implemented by 2013.

Installation of a sub artesian water supply well is planned for Bozalganly village in Tovuz region in 2012.

It is anticipated that all of the above projects will be completed prior to construction of the proposed SCPX Project. These are therefore not considered in the assessment of potential additive impacts (Section 11.4).

11.3.9 Construction of Municipal and Administration Buildings

A number of future building projects are likely to be undertaken within the towns and villages close to the proposed SCPX Project. These include:

- A regional toxicology lab to be constructed in the Yevlakh region
- Construction of an orphanage in the Tovuz region (planned for 2012)
- Construction of between 5 and 20 veterinary centres in various regions crossed by the proposed SCPX Project. The exact locations are yet to be determined.
- Construction of two 180-pupil secondary schools in the Yevlakh region (one in Balchily village, approximately 7km from the SCPX route corridor, and one in Aran village, approximately 2km from the SCPX route corridor).

It is anticipated that these projects will have been completed prior to commencement of construction of the SCPX Project. These are therefore not considered in the assessment of potential additive impacts (Section 11.4).

11.3.10 Residential Development

Land adjacent to the north-west corner of Samukh Camp Option 3 (proposed Construction Camp site) was being prepared for residential development when the area was visited in October 2012. It is anticipated that, if this progresses, it will have been completed prior to commencement of construction of the SCPX Project. It is therefore not considered in the assessment of potential additive impacts. However, if it is built the Project will assess the impacts of the construction camp and pipe storage area on the residents and implement any necessary mitigation measures.

11.4 Assessment of Potential Additive Impacts

The potential additive impacts in the following sections are assessed against the baseline conditions described in Chapters 7 and 8. Where it is considered that there is broadly sufficient knowledge about the other projects, the same significance criteria and ranking system have been used as for the SCPX Project alone, in line with the definitions of the levels of potential impacts in Chapter 3. However, where there is less project definition and knowledge it would not be appropriate to apply these significance criteria, and professional judgement has been used to identify whether the potential residual impact is likely to be beneficial, negative or neutral (i.e. no cumulative impact).

Table 11-1 provides an indication of the type of potential cumulative impacts that could occur as a result of the SCPX Project when considered along with other proposed developments that are known about, and for which there is a reasonable level of information. Each potential cumulative impact is discussed in more detail in the following sections. In general, those residual impacts from the SCPX Project that are identified in Chapter 10 as being of medium significance or above, or beneficial, have been considered in more detail in the sections below. Where sufficient information exists, the assessment of significance in accordance with Chapter 3 is also included.

Table 11-1: Significance of Potential Additive Impacts

Aspect	Existing Oil and Gas Pipelines (Future Maintenance Activities Only)	Road and Railway Developments	Agricultural Improvement Projects	Irrigation System Repair Projects	Fibre Optic Cable
Natural resources		-			
Soils and ground conditions	+	-	+	-	-
Land ownership and use			+	+	
Landscape and visual		-			-
Water resources		-		-	-
Ecology	- (for aquatic and riparian ecology at watercourses)	- (for aquatic and riparian ecology at watercourses)		-(for aquatic and riparian ecology at watercourses)	- (for aquatic and riparian ecology at watercourses)
Air quality		-		-	-
Noise and vibration		-		-	-
Cultural heritage	+	unknown		unknown	unknown
Employment and skills		+	+	+	+
Livelihoods		+ (for goods and service suppliers)	+ (for goods and service suppliers)	+ (for goods and service suppliers)	+ (for goods and service suppliers)
Community health and safety		-		-	-
Traffic		-		-	-
Unplanned events	-	-		-	-

Type Key

-	Potential negative cumulative impact
	Neutral (i.e. no anticipated cumulative impact)
+	Potential beneficial cumulative impact

11.4.1 Natural Resources

All construction projects use natural resources such as fuel and aggregates and contribute to a reduction in the availability of such finite resources for future projects.

Road and rail projects use a large quantity of aggregates for land forming and grading. Construction projects use aggregates in concrete manufacture. The proposed SCPX Project will require significant volumes of aggregate for construction of the platforms at the pigging station and block valves, earthworks at the pipeline construction camps and pipe storage yards, and construction of the new access road to the pigging station, and temporary access roads to the ROW during construction. The aim is to avoid importing padding material for the pipeline by selective use of material excavated from the trench. To meet the general demand for aggregate, the SCPX Project may require new borrow pits or quarries to be opened, but Azerbaijan has many locations suitable for quarrying so this is not expected to significantly deplete the availability of aggregate for other projects in the future.

However, should the road and/or rail projects be constructed in similar locations at the same time as the SCPX Project, there may be significant cumulative impacts from transportation of aggregates from the borrow pits and quarries to the construction sites, and from the operation of concrete batching plants. This is particularly the case in the area of Dallyar Dashbulak (KP287–289) where the Shamkir bypass will be constructed in close proximity to the proposed SCPX Project. Potential cumulative impacts associated with transportation of

aggregate by vehicle are discussed further in the following sections: air quality (Section 11.4.7), noise and vibration (Section 11.4.8), community health and safety (Section 11.4.12) and traffic (Section 11.4.13).

Only very limited amounts of aggregate are likely to be required for ongoing maintenance of the existing pipelines, the agricultural improvement projects, irrigation system repair projects and installation of the fibre optic cable.

The cumulative environmental impact in terms of use of resources is therefore considered likely to be potentially negative.

11.4.2 Soils and Ground Conditions

Where thin, highly erodible soils are encountered along the route of the 56"-diameter pipeline, construction activities may result in temporary and localised increases in soil erosion and gulying, which may also result in poor reinstatement.

The proposed road and rail building/upgrading, fibre optic cable and irrigation system and repair projects are likely to result in similar impacts, although the projects are not in close enough proximity for the impacts to be considered cumulative. The cumulative impact is therefore, considered likely to be potentially negative.

Ongoing maintenance of the existing BTC, SCP and WREP pipeline corridors may result in a positive cumulative impact, as the maintenance works are designed to ameliorate the areas where the existing pipelines' ROW is exhibiting erosion, thereby reducing the cumulative impact of the projects. Therefore, this is considered a potentially positive cumulative impact.

It is also considered that there is the potential for a positive cumulative impact from the agricultural improvement projects, should these be implemented on land crossed by the proposed SCPX Project. Implementation of these projects may result in improved farming practices, resulting in improvement of soil conditions, including fertility.

11.4.3 Land Ownership and Use

The potential for cumulative impacts on land ownership and use, including PACs and PAPs, is considered to be very localised and would only be apparent with projects in very close proximity. Should the irrigation system repair and agricultural improvement projects be implemented with the same PACs and PAPs as those affected by the proposed SCPX Project, it is anticipated that there may be a potentially beneficial cumulative impact on land ownership and use.

The majority of the road, rail and fibre optic cable projects are unlikely to be of sufficient proximity to affect the landowners and users impacted by the proposed SCPX Project. Therefore, no significant cumulative impact is predicted and the impact is therefore considered potentially neutral. However, in the area of Dallyar Dashbulak (KP287–289), the location of the proposed Shamkir bypass is sufficiently close (within 200m) that there is the potential for significant cumulative impact on land ownership and use as the PACs and PAPs are likely to be the same as those affected by the proposed SCPX Project. The extent of this impact cannot however be predicted accurately at this stage as the compensation policies and mechanisms to be implemented by the Ministry of Transport will be subject to the Law on Purchase of Lands for State needs. The law does envisage fair compensation for land owners and lessees.

The PACs and PAPs affected by the existing pipelines are also likely to be the same PACs and PAPs as those affected by the proposed SCPX Project. However, as the BTC, SCP and WREP projects have established compensation policies for ongoing impacts from maintenance activities, the cumulative impacts are therefore considered potentially neutral.

11.4.4 Landscape and Visual

Construction of the proposed SCPX Project will be a temporary visual impact in most locations. After reinstatement and biorestorement of the ROW, temporary access roads, construction camps and pipe storage yards, it will take approximately 2–5 years for vegetation to be re-established. Thereafter, these areas should blend into the landscape as the other pipelines do in most places, and the cumulative impact is considered to be potentially neutral. In certain areas where the pipeline crosses thin erodible soils and steep ridges that may be prone to erosion, it may take longer for the restored ROW to merge into the landscape and the cumulative impacts with other future projects may therefore be greater (based on professional judgement this is considered to be up to medium significance) should a future project be in close proximity to the proposed SCPX Project.

At specific locations, the presence of the pipeline ROW will permanently alter the visual appearance and character of the landscape. This is particularly the case in areas where the ROW will be benched (levelled) to create a safe working area for plant and machinery. There will also be permanent facilities; pigging station, block valves and aerial marker posts, which will permanently alter the visual appearance and character of the landscape.

Although the proposed rail and road building and upgrading and fibre optic cable projects will result in permanent landscape and visual impacts, the majority are a sufficient distance away from the SCPX Project and the landscape character is already considered degraded in most of these areas. Therefore, the cumulative impact of the SCPX Project in relation to these projects is considered to be potentially negative.

However, in the area of Dallyar Dashbulak (KP287–289), the location of the proposed Shamkir bypass is sufficiently close to the proposed SCPX Project (within 200m) that there is the potential for significant cumulative landscape and visual impact. The landscape character of the surrounding area is also considered to be of higher quality than other areas along the route, and therefore the potential cumulative landscape impact in this area is considered to be of medium significance.

11.4.5 Water Resources

The SCPX Project may result in potential impacts on groundwater if hazardous waste or chemical or fuel tanks are stored, without appropriate mitigation increasing the risk of contamination from spills, particularly in high sensitivity areas such as the Karayazi aquifer, which has high vulnerability and is in hydraulic continuity with the Karayazi Wetland, part of the Karayazi Reserve. However, site-specific measures will be implemented and risk assessments will be undertaken to develop additional mitigation measures if required.

The SCPX Project will need to extract water from rivers for hydrostatic testing of the pipeline. SCPX proposes to discuss its need to extract water with the relevant water authority and apply for consent to abstract, limiting the water it extracts to 10% of the flow in a river.

Maintenance activities on the other pipelines are considered unlikely to result in the requirements for abstraction of large quantities of water, so this aspect is not considered likely to result in cumulative impacts with the SCPX Project.

Agricultural improvement and irrigation system repair projects may result in increased demand on water resources; however they may also improve existing poor practice and damaged networks, resulting in lower water consumption. It is therefore considered that there is no likely cumulative impact on water resource demand from these projects.

It is not known whether the proposed rail or road building/upgrading, irrigation system repair and fibre optic cable projects will need to abstract surface or ground water during their construction, but if they do it is unlikely to be in large quantities. There is the potential for pollution of sensitive water resources during construction in the same way as for the proposed SCPX Project. The cumulative impact is considered to be potentially negative;

however, like pipeline construction, large volumes of fuel, oil or chemicals are unlikely to be used during construction.

11.4.6 Ecology

Certain parts of the proposed SCPX ROW pass through particularly sensitive habitats, which contain protected species of flora and fauna. The route also crosses rivers that contain protected species of fish. Mitigation measures have been put in place with a view to minimising impacts to habitats, flora and fauna, such as translocation of certain species of flora (e.g. *Iris camillae*), non-open-cutting certain watercourses or imposing seasonal constraints during fish spawning.

Construction of the proposed SCPX Project is expected to have a temporary impact on habitats, flora and fauna in most locations. After reinstatement and biorestoration of the ROW, temporary access roads, construction camps and pipe storage yards, it is anticipated to take approximately 2–5 years for vegetation to be re-established. In certain areas where the pipeline crosses fragile desert habitats that may be prone to erosion, full biorestoration may take longer to achieve and the cumulative impacts with future projects may therefore be potentially negative where future projects are in close proximity.

Only a small area of habitat is proposed to be permanently removed owing to the presence (footprints) of the pigging station, new access road and block valves.

Cumulative impacts from the road and rail projects include permanent removal of habitat. The irrigation system repair and fibre optic cable projects may also involve permanent removal of habitat, but at a minor scale. This is considered of lower significance, as these projects are mostly upgrades and will be in general an extension to the existing footprints rather than completely new ones in areas of undisturbed habitat.

There is likely to be a greater cumulative impact at river crossings (and potential for impact on riparian habitats, fish and fish spawning), as the road, railway and fibre optic cable projects will be crossing the same rivers as the proposed SCPX route. Particularly at sensitive river crossings (e.g. Kura East, Kura West, Hasansu, Goshgarachay, Kurekchay and Tovuzchay), there is therefore the potential for a medium-significance cumulative impact on aquatic and riparian ecology.

Where maintenance work is taking place at river crossings on the BTC, SCP and WREP pipelines, and if the irrigation system repair projects cross or interact with watercourses, there is again the potential for a lower-significance cumulative impact on ecology at river crossings.

11.4.7 Air Quality

At locations where construction of the proposed SCPX Project passes in close proximity to dwellings and at camps and pipe storage areas close to dwellings, construction dust may cause a temporary nuisance to local residents (within the PACs). Construction in general raises dust from earthworks or vehicle movements, and if any of the proposed road and rail building/upgrading, fibre optic cable and irrigation system repair projects are carried out close to SCPX pipeline and at the same time as SCPX construction, there could be some additional dust in the atmosphere or the duration of increased dust concentrations could be longer. As well as potentially causing nuisance to nearby residents, dust could also potentially lead to reduced crop productivity or, in extreme cases, increased respiratory problems for nearby residents. However, the potentially negative cumulative impacts from dust are expected to be very localised and temporary and are therefore considered likely to be of lower significance for the majority of the proposed road and rail building/upgrading, fibre optic cable and irrigation system repair projects.

However, in the area of Dallyar Dashbulak (KP287–289), the location of the proposed Shamkir bypass is sufficiently close to the proposed SCPX Project (within 200m) that there is the potential for significant cumulative impact on local air quality, particularly in terms of

construction plant emissions and dust generation from earthworks and vehicle movements. The cumulative impact on air quality in this localised area is therefore considered to be of medium to high significance, as the two projects are scheduled to be constructed at the same time.

No significant cumulative impact (i.e. potentially neutral) is predicted to result from construction of the SCPX Project and ongoing maintenance work on the existing pipelines and agricultural improvement projects since limited dust generation is expected.

11.4.8 Noise and Vibration

At locations where construction of the proposed SCPX Project passes in close proximity to dwellings and at camps and pipe storage yards close to dwellings, noise may cause a temporary disturbance to local residents. Construction in general results in noise emissions, and if any of the proposed road and rail building/upgrading, fibre optic cable and irrigation system repair projects are carried out close to the SCPX Project and at the same time as SCPX pipeline construction, there could be some additional noise emissions or the duration of increased noise emissions on any particular receptor could be longer. However, in general, the potentially negative cumulative impacts from noise are anticipated to be very localised and temporary and are therefore considered likely to be of lower significance.

The proposed road building/upgrading, fibre optic cable and irrigation system repair projects are likely to use the same road networks that the SCPX proposes to use for logistics and transport. They may also use the same roads at the same time as those for the SCPX Project. If this were to happen, the risk of damage from vibration would be increased for the most vulnerable properties. Damage of properties adjacent to more major roads is considered less likely, as they are generally set back further from the road where traffic volumes are higher; if buildings are vulnerable to vibration, it is more likely that damage will have already occurred and will not be directly attributable to any of these projects. The overall cumulative impact from vibration is therefore considered likely to be of lower significance, although this could be medium for a few individual buildings.

However, in the area of Dallyar Dashbulak (KP287–289), the location of the proposed Shamkir bypass is sufficiently close to the proposed SCPX Project (within 200m) that there is the potential for significant cumulative impacts on the local PACs and PAPs from noise and vibration from construction activities and vehicle movements. The cumulative impact on noise and vibration in this localised area is therefore considered to be of medium to higher significance, as the two projects are scheduled to be constructed at the same time. A potentially neutral (i.e. no significant) noise and vibration cumulative impact is predicted to result from ongoing maintenance work on the existing pipelines or the agricultural improvement projects.

11.4.9 Cultural Heritage

During construction of the existing BTC and SCP pipelines a robust and systematic programme of cultural heritage management was followed. This is also proposed to be adopted by the SCPX Project. Pre-construction surveys and excavations of known sites in the vicinity of the pipeline are proposed to be carried out to increase understanding of the sites and enable micro re-routing if necessary. The excavated sites will be recorded, artefacts analysed and results published. The contribution to the knowledge of the archaeology within the area and Azerbaijan as a whole is considered a potentially beneficial impact.

If the proposed future projects were to follow as robust an approach to cultural heritage management, this would be considered a potentially positive cumulative impact. If such an approach is not followed, there is a risk of destroying unknown archaeology before it can be recorded. This would constitute a potentially negative impact.

In the area of Dallyar Dashbulak (KP287–289), the location of the proposed Shamkir bypass is sufficiently close (within 200m) to the proposed SCPX route, and existing BTC and SCP

pipelines, that there is the potential for cumulative impacts on cultural heritage, since the proposed route of the bypass currently crosses known cultural heritage sites discovered during the BTC and SCP projects. The extent of this impact cannot however be predicted at this stage as the Ministry of Transport's approach to cultural heritage management is not known.

Ongoing maintenance work on the BTC, SCP and WREP pipeline follow a strict cultural heritage management procedure, and therefore the cumulative impact is considered potentially positive.

The approach to be adopted by the proposed road and rail projects is unknown at this stage, and therefore the significance of the cumulative impact remains unknown.

11.4.10 Employment and Skills

The concurrent construction of any of the proposed developments (plus any future funded projects currently undefined) together with the SCPX Project will increase the number of jobs available to the local population. Training opportunities would also develop a greater skills base in the workforce within the local communities, and in turn they should therefore be in a better position to gain employment on future projects. In areas of Azerbaijan that have a history of relatively high unemployment, new projects bring significant social benefits in terms of continuing employment and income. It is therefore considered that this is likely to be a potentially positive cumulative impact.

11.4.11 Livelihoods

The potential for cumulative impacts on livelihoods is considered to be very localised. The SCPX Project may affect the livelihoods of people who own or use land that is used for pipeline or facility construction (PAPs). Compensation payments aim to offset adverse impacts on livelihoods arising from the SCPX Project, so the significance of the impacts is intended to be neither adverse nor beneficial.

In general, the road and rail building/upgrade, fibre optic cable and irrigation system repair projects are unlikely to be of sufficient proximity to affect the livelihoods of landowners and users impacted by the proposed SCPX Project. There is therefore considered to be a potentially neutral cumulative impact for PAPs.

In the area of Dallyar Dashbulak (KP287–289), however, the location of the proposed Shamkir bypass is sufficiently close (within 200m) that there is the potential for significant cumulative impact on livelihoods as the PACs and PAPs are likely to be the same as those affected by the proposed SCPX Project. The construction of the bypass will mean that more people in this area will be either physically or economically displaced. The extent of this impact cannot however be predicted at this stage as the compensation policies and mechanisms to be implemented by the Ministry of Transport are not known.

The PAPs affected by the existing pipelines are also likely to be the same PAPs as those affected by the proposed SCPX Project. However, as the BTC, SCP and WREP projects have established compensation policies for ongoing impacts from maintenance activities, there are predicted to be no significant cumulative impacts.

The cumulative impact is expected to be beneficial for those businesses and individuals who are able to provide goods or services to more than one of the projects.

11.4.12 Community Health and Safety

The SCPX Project will act beneficially to raise awareness of health and safety issues, both through training of personnel involved in the projects and by supplying information to PACs. This process of awareness raising, should it also be adopted by the other projects, is a potentially positive cumulative impact and will already have started during the BTC, SCP and WREP pipeline construction phases.

Should the planned road and rail upgrade, fibre optic cable and irrigation system repair projects take place at the same time as the proposed SCPX Project, it would have the effect of lengthening the period for which PACs are exposed to noise, dust and vibration disturbance and the risk of road traffic accidents. In this case, the cumulative impact on community health and safety is considered to be of medium to higher significance. This is particularly the case in the area of Dallyar Dashbulak (KP287–289), where the Shamkir bypass is proposed, and where the cumulative impact is considered to be of higher significance, as the projects are due to be constructed concurrently.

Maintenance work on the existing pipelines and the agricultural improvement projects are considered to have a potentially neutral cumulative impact on community health and safety.

The cumulative impact on community health of dust raised by various projects is discussed in Section 11.4.7.

11.4.13 Traffic

The proposed SCPX Project will involve a large number of vehicle movements on public roads that are also used by other developments and construction projects, as well as the public. This could have a cumulative impact in terms of temporary congestion or an increased risk of accidents, and is considered to be a potentially negative.

Should the road and/or rail projects be constructed in similar locations at the same time as the SCPX Project, there may be significant cumulative impacts from general construction traffic movements, including transportation of aggregates from the borrow pits and quarries to concrete batch plants and construction sites. This is particularly the case in the area of Dallyar Dashbulak (KP287–289) where the proposed Shamkir bypass will be constructed in close proximity to the proposed SCPX Project and where the cumulative impact is considered to be of higher significance, as the projects are due to be constructed concurrently.

Maintenance work on the existing pipelines and the agricultural improvement projects are not considered to have a significant cumulative impact on traffic.

Impacts of noise and vibration from increased traffic movements are considered in Section 11.4.8. Impacts on air quality, including dust, from increased traffic movements are considered in Section 11.4.7.

11.4.14 Unplanned Events

New developments will not be permitted within a defined distance from the proposed SCPX pipeline or facilities in accordance with Azerbaijani law, and any development planned within 500m will be subject to risk assessment. Keeping third-party developments a safe distance from the SCPX facilities means that third-party incidents are extremely unlikely to escalate to include SCPX or vice versa.

Like the existing BTC, SCP and WREP pipelines, the SCPX pipeline will be buried. Risk assessment studies have been carried out to establish normal separation distances between the pipelines are considered sufficient to prevent a full bore rupture and explosion of one pipeline from escalating to the other pipelines. This makes the likelihood of a cumulative impact with the other pipelines extremely low.

The existence of the exclusion zones around the pipeline and facilities should rule out any cumulative impacts due to interaction with future development projects.

Strict procedures exist for any BTC, SCP and WREP maintenance activities that are required in close proximity to the SCPX pipeline or facilities. This is intended to ensure that the potential for an unplanned event is as low as possible.

The railway improvement project, once operational, could potentially have a positive cumulative impact in terms of reducing the impact of pollution from unplanned events, as there is anticipated to be a lower risk of derailment of oil-carrying trains along the improved railway line.

11.4.15 Spatial Extent of Potential Additive Impacts

In general the additive impacts of future projects with the proposed SCPX Project are likely to be localised in nature, the most significant area of impact being Dallyar Dashbulak (KP287–289) where the proposed Shamkir bypass has been routed. Table 11-2 summarises the predicted spatial extent of the additive impacts.

Table 11-2: Spatial Extent of Additive Impacts

Project	Local	Regional	National	International
Existing pipelines maintenance	+	+	-	-
Road developments	+	+	-	-
Rail developments	+	+	-	-
Agricultural improvement projects	+	-	-	-
Irrigation system repair projects	+	-	-	-
Fibre optic cable	+	-	-	-

Key

-	Cumulative impact not present
+	Cumulative impact present

11.5 Assessment of Potential In-Combination Impacts

There is no established ESIA methodology for assessing and quantifying the combined effects of individual impacts. Accordingly, it has been necessary to undertake a qualitative assessment of potential interactions using available information and professional judgment and experience, in order to identify key residual impact interactions (or in-combination impacts) on receptors and resources that may occur.

The assessment of in-combination impacts focuses on situations where adverse residual impacts of medium significance and above, and beneficial effects were recorded in individual topic areas for the construction and operational phases of the proposed SCPX Project.

For some topic areas, there are considered to be direct inter-relationships between effects that could potentially occur in conjunction (i.e. interactively) to generate a combined effect on sensitive receptors. Examples include the combined effects of noise, vibration, traffic, dust and visual intrusion during construction.

For other topic areas, limited or no potential is thought to exist for combinations of effects to occur on receptors. Such examples include topics where negligible or no residual effects were recorded (e.g. geology and geomorphology), and/or where no clear inter-relationship exists between different topic areas (e.g. archaeology and terrestrial ecology). In such instances, these aspects were not considered further in the interactions assessment.

The key interactions are generally confined to effects experienced on human receptors that have a direct relationship to the various Project components (i.e. residential receptors close to the ROW, BVRs, pigging station, pipe storage yards and construction camps, users of water resources, and wider settlements and communities/PACs).

The significant in-combination impacts are considered to be mainly restricted to the construction phase. The assessment has identified that properties/communities in close proximity to the proposed pipeline ROW will potentially experience a combination of temporary effects associated with increased noise, vibration, localised dust generation, visual intrusion and potentially degradation in air quality due to the number and proximity of vehicle movements while construction is being undertaken in that area. The areas where these in-combination impacts have been identified as a potentially significant issue, where dwellings are in very close proximity to the ROW are: Chiny village, closest house approximately 80m; Garaberk village, closest house approximately 20m; Alpout village, closest house approximately 50m; and Dallyar Dashbulak village, a dwelling and farm infrastructure within the proposed ROW which may be required to be relocated, closest house approximately 20m. These distances are from the pipeline centreline, and therefore the 36m ROW itself will be closer. This section of the route around Dallyar Dashbulak village is currently under review and a re-route is being considered, but as there is other infrastructure, existing and proposed, it is uncertain on whether a re-route will be possible.

In-combination impacts may potentially be experienced by communities close to construction camps, pipe yards and access roads. These communities are considered likely to experience a similar combination of temporary effects to those experienced by properties/communities along the route. There is also expected to be an increased number of vehicle movements on local roads during the construction phase of the Project. This effect may be somewhat ameliorated by the intent of the Project to upgrade local roads that are to be used as access routes to the pipeline ROW.

A summary of the key in-combination impacts predicted during construction is provided in Table 11-3.

Table 11-3: Summary of Significant Construction Phase In-combination Impacts

Location	Air Quality	Noise and Vibration	Traffic	Livelihood	Landscape and Visual	Community Safety
Chiny Village (KP106)						
Garaberk Village (KP118)						
Alpout Village (KP123)						
Dallyar Dashbulak Village (KP288)						
Communities close to construction camps, pipe storage areas and access roads						

Grey cells indicate significant in-combination impact

Landowners and tenants of affected landholdings may be subject to a combination of localised disruption to their current agricultural regimes and construction effects of the type described above.

Given the temporary nature of construction works and the fact that works along the pipeline ROW are scheduled to progress in a linear manner, any such effects are anticipated to be short term, the significance of which are expected to vary depending on the timing, extent and nature of operations undertaken and the effectiveness of the mitigation employed.

During the operational phase, in-combination effects are considered likely to be of low significance and limited to visual impact (permanent presence and night time lighting), slight local air quality degradation, and generator noise from the pigging station. There are not considered to be any significant in-combination effects from the presence of the BVRs.

11.6 Assessment of Transboundary Impacts

While this ESIA focuses on the part of the proposed SCPX Project that is proposed to be constructed and operated in Azerbaijan, SCPX is also an international project. It will transport gas from Azerbaijan, where it is produced, to countries where the gas will be used (Georgia, Turkey and other European countries).

Given that disturbance of individual people (e.g. by visual impact, noise, dust), habitats and wildlife is considered in general to be inherently local, and that the export of hazardous waste is controlled by the Basel Convention, two potential pathways of transboundary impact have been identified. Firstly the Kura River could potentially convey contaminants from sources in the SCPX Project area in Azerbaijan to the Caspian, thereby potentially impacting the Caspian littoral states of Russia, Kazakhstan, Turkmenistan and Iran). Secondly, Project emissions of air pollutants could, depending on dispersion, have transboundary impacts. Emissions of greenhouse gases (although negligible) will also occur.

11.6.1 Kura River

The Kura River flows into Azerbaijan from Georgia, crosses the country and enters the Caspian Sea south of Baku. The SCPX Project crosses the Kura in two places (Kura East and Kura West), the Kura East crossing being the furthest downstream and therefore closer to the Caspian. It is, however, considered extremely unlikely that any potential pollutant could reach the Caspian if an incident were to occur, as the distance from the Kura East crossing to the Caspian is over 200km.

Additionally, the SCPX Project proposes to micro-tunnel under the Kura West crossing and Horizontally Directionally Drill (HDD) the Kura East crossing, which should not impact water quality. Abstracting hydrotest water from the Kura River at a controlled rate is unlikely to have a significant effect on the Caspian. Should hydrotest water be discharged into the Kura, the Project will test the water prior to discharge to confirm that it will not contaminate the river for downstream users.

Should any sediments enter the river during construction, they are expected to settle back to the river bed long before reaching the Caspian.

If a fuel-oil spill during construction of the pipeline entered a river, the Emergency Response Plan (see Chapter 12, Hazard Analysis and Risk Assessment) would be implemented with the aim of limiting the effects of oil contamination on downstream users of the river water. The river crossings are a sufficient distance upstream of the Caspian that the effects of a spill on water quality in the Kura River are expected to be resolved before the water reaches the sea. The significance of potential transboundary impacts on the Caspian and surrounding littoral states owing to changes in river water quality is therefore considered likely to be negligible.

11.6.2 Atmosphere

The SCPX Project within Azerbaijan does not include facilities such as compressor stations and pressure reduction stations that can generate significant atmospheric pollutants and greenhouse gas emissions. The pigging station is the only facility in Azerbaijan where any non-fugitive air emissions will be generated during planned operations and these are expected to be very minor, being limited to running of a diesel generator to provide power and occasional (once every two years) venting of small amounts of methane during pig launching. Therefore, transboundary effects as a result of atmospheric pollutants and greenhouse gases by winds blowing across the national borders (to Georgia, Armenia, Iran or Russia) are considered to be negligible. Any disturbance of individual receptors during construction (e.g. by dust) are expected to be inherently local and temporary and therefore not to lead to transboundary impacts.

11.6.3 Assessment of Overall Project GHG Emissions

Specific emissions of greenhouse gases (GHG) are not directly linked to local impacts but may contribute to increasing the global concentration of these gases. The carbon dioxide emitted from all combustion equipment is a greenhouse gas. Methane is a more potent greenhouse gas than carbon dioxide. For the SCPX Project fugitive emissions from flanges and connections, as well as maintenance and emergency venting at facilities, will result in the release of methane as the main component of natural gas.

11.6.3.1 Construction phase – Azerbaijan

Atmospheric emissions during the construction phase of the proposed SCPX Project will primarily be associated with the use of road vehicles and construction equipment. Elements of the Project that will cause the majority of emissions include construction of the block valves, pigging station and pipeline, and also construction, operation and maintenance of the camp and pipe storage areas and the associated concrete batching plants.

Direct GHGs emitted during construction will predominantly be limited to CO₂, with the majority of other emissions not being classed as direct GHGs (i.e. CO and NO_x). The total amount of CO₂ estimated to be emitted throughout the entire construction phase has been estimated to be 317,587 tonnes.

Certain hydrocarbon (HC) emissions can also be classed as direct GHGs. The primary source of HC emissions is gasoline engines, which emit HCs during cold start. HC emissions throughout the construction phase of the Project have been estimated to be approximately 737 tonnes. However, it is not possible to know the composition of HC compounds being emitted and it is therefore not possible to precisely determine a CO₂ equivalent (CO_{2eq}). HCs emitted during cold start have a low CO_{2eq}; a CO_{2eq} of 1 has therefore been assumed as a worst case scenario.

Therefore, throughout the entire construction phase the total amount of CO_{2eq} likely to be emitted has been estimated to be approximately 318,324 tonnes.

11.6.3.2 Operational phase - Azerbaijan

During the operational phase of the proposed SCPX Project, atmospheric emissions are likely to be minimal. The primary sources of emissions will be from the block valves and pigging stations.

GHG emissions associated with block valves are predominantly those released during a major accident, fugitive emissions from the block valves themselves and annual valve testing emissions. Annual emissions of CO₂ and CH₄ have been estimated using UK Offshore Operators Association (UKOOA) emission factors for onshore gas facilities, based on a gas composition of 94.14% CH₄ and 0.23% CO₂. Each block valve has one actuator that will be stroked once a year for testing, which will result in a gas release of approximately 3.62m³. Total block valve emissions equates to approximately 94 tonnes CO_{2eq} for all the SCPX block valves in Azerbaijan, per annum and 2830 tonnes CO_{2eq} over the lifetime of the Project.

The pigging station in Azerbaijan has minimal power requirements that will be provided by five to eight Thermo Electric Generators (TEGs), with any possible additional power requirements being supplied by a temporary generator. GHG emissions from the pigging station will primarily be associated with the TEGs, venting operations and fugitive emissions. Total CO_{2eq} emissions from the pigging station during operation have been estimated to be approximately 376 tonnes per annum and 11,280 tonnes over the lifetime of the Project.

Fugitive emissions from the pipeline will also contribute towards GHG emissions. While there are a number of inherent uncertainties associated with calculating fugitive emissions, total CO_{2eq} fugitive emissions from the pipeline are expected to be approximately 63 tonnes

per annum and 1,890 tonnes over the lifetime of the Project. There should be no operation emissions associated with the pipeline.

Annual GHG emissions from the SCPX block valves, pigging station and pipeline in Azerbaijan are therefore expected to be approximately 533 tonnes CO_{2eq}.

Annual emissions from the block valves and pigging station are considered relatively insignificant when compared with the annual SCP pipeline emissions of 1.843 million tonnes CO_{2eq}.

11.6.3.3 Overall Project GHG emissions

Although there will be negligible GHG emissions from the Azerbaijan portion of the SCPX Project during operations, an assessment of the overall emission of GHGs expected from the proposed SCPX Project is provided below so that emissions from the Project as a whole can be placed in context.

During the operation of SCPX in Azerbaijan and Georgia, it is estimated that the consumption of gas for compression, power generation, water bath heaters, together with the venting of gas for emergency or maintenance blowdown, and fugitive emissions from the facilities and pipeline will emit greenhouse gases at the rate of approximately 599,800 tonnes of direct CO_{2eq}/yr. In addition, the Project is expected to result in approximately 4000 tonnes of indirect CO_{2eq}/yr owing to the electricity imported from the Georgian grid, based on the current generation mix¹.

The International Energy Agency (IEA, 2011) states Georgia's national CO₂ emission at 5.7 million tonnes in 2009. Georgia happens to be the optimum location for the Project's large compression stations for technical reasons; at the same time it happens to be a country with relatively low reported GHG emissions.

Benchmarking the energy consumption and GHG emissions associated with transporting the energy from different hydrocarbon reservoirs to the end user by various routes is complicated by the range of different parameters that apply to particular projects.

A US National Energy Technology Laboratory (Skone *et al.*, 2011) study looked at the life cycle of US natural gas from various sources. The study observed that the GHG emissions from the transportation phase (that being comparable to the SCP/SCPX system) of the life cycle increase linearly with pipeline distance. For gas delivered over 971km to a large end user such as a power station, the study found that 1.3% of the gas extracted was consumed in the transportation stage (0.8% in fuel use, 0.5% in fugitive losses and smaller levels in venting and flaring). The transportation distance they studied was 1.4 times the distance of the SCP/SCPX system from Sangachal terminal to the Turkish border. Applying a factor to account for the difference in transport distance reduces the losses to 0.9% of extracted gas consumed to transport gas a distance of 690km (i.e. the distance from Sangachal Terminal in Azerbaijan to the Georgia–Turkey border).

¹ Assuming approximately 87% of Georgia's electricity is generated from hydroelectric power (http://www.iea.org/stats/electricitydata.asp?COUNTRY_CODE=GE; IEA, 2011)

Table 11-4: SCPX Greenhouse Gas Emissions and US Comparison

Emitted Greenhouse Gas	Theoretical Emissions if SCPX Throughput was in US System (Hence Lost as per NETL Findings)			SCPX Predicted Actual Emissions			
	Fuel Use	Fugitive Emissions	Total (Rounded to Three Significant Figures)	Fuel Use	Fugitive Emissions	Venting	Total (Rounded to Four Significant Figures)
Carbon dioxide	372,861	560	373,000	542,240	21	2	542,300
Methane	125	83,608	84,000	179	1755	364	2300
Total GHG (as carbon dioxide equivalent)	375,979	2,090,751	2,467,000 x 690/971 (distance correction) = 1,7,000	546,715	43,897	9102	599,800

US losses and emissions due to venting and flaring assumed to be zero, as study reports 0.0% (though presumably rounded). SCPX losses from venting are also 0.0% when rounded, though emissions are included in this table for completeness and consistency. Total GHGs are calculated on 100-year time horizon basis using global warming potentials of 25 for methane, per Intergovernmental Panel on Climate Change Assessment Report IPCC AR4.

It is predicted that SCPX will use or emit directly via venting or fugitive emissions, 199,600 tonnes of gas per year, representing 1% of the extracted gas. This is slightly higher than the findings of the US study, with the distance correction applied. In terms of the GHG emissions, however, the comparison changes. If the rates of gas consumption that Skone *et al.* used to represent the US transmission network in their study are applied to SCPX, there would be emissions of 1.8 million tonnes of CO_{2eq} per year, which is around 2.8 times the emission of approximately 600,000 tonnes CO_{2eq} per year that is actually predicted for the SCPX Project (see Table 11-4).

The indirect emissions associated with SCPX's imported electricity are not included in this comparison, as there is no indication that Skone *et al.* included that category of emissions in their study, except where it was used to power compressors (which is not applicable to SCPX).

Inclusion of the indirect emissions associated with the electricity grid, and taking into account the greenhouse gas reduction measures and the seasonal operation of the compressor stations, estimates that the SCPX Project (in Azerbaijan and Georgia) is likely to emit approximately 604,000 tonnes CO_{2eq} per year.

It is recognised that the comparison of gas transmission via SCPX with the US gas network is not a like-for-like one owing to many factors, although steps have been taken to account for differences, e.g. in correcting for the difference in transmission distances involved. The comparisons made in this section should be viewed in that context.