Chapter 11 Cumulative and Transboundary Impacts

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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. For clarity, the additive impacts of the collocated BTC operational facilities and proposed SCPX facilities (i.e. PSG1 and CSG1) are described in more detail in this chapter.

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 Georgia and affect sensitive receptors in other countries.

11.2 Spatial and Temporal 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.

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

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

- Areas that will be used for construction work where soil and cultural heritage could be disturbed:
    - The 36m-wide ROW of the 56” pipeline from the Georgia/Azerbaijan border to KP56
    - The pipe yard at Rustavi
    - The pipeline construction camp at Poladantkaari
    - The route of the 8m-wide access road from Nardevani to CSG2
    - The sites of the facilities at CSG1 (KP03), CSG2 (KP142) and the PRMS (KP 247) and their associated construction camps and laydown areas

- Areas from which pipeline construction and the facilities will be visible as defined by the zone of theoretical visibility diagrams (refer to the Environmental and Social Baseline Report and Chapter 7 Environmental Baseline for a summary)
- The area up to approximately 300m from the pipeline and the facilities in which dust from construction work can settle
- The areas where construction noise will be audible (up to approximately 400m from the pipeline ROW and within a similar distance of the facility construction sites) and the areas where operational noise will be audible (within the contours defined around the facilities by noise modelling)
- The stretch of the Algeti River, south of the open-cut crossing, that could experience an increased silt load
- The area inside the air quality modelling contour predicting increased NO_x and CO concentrations above background levels (see Figures 10-5 to 10-12)
- The 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 for construction phase impacts has been set to include the period during which the construction work is proposed to be carried out and the period during which bio-restoration and landscape planting will become effective. This is a period of approximately 10 years. Operational impacts have been considered during the Project design life of 30 years.

Transboundary
International level: Transboundary effects relate to pathways by which contaminants could be transported to sensitive receptors located in Azerbaijan and Turkey. In practice this is limited to the transfer of atmospheric pollutants by winds blowing across the national borders, and potential contaminants that might affect the water quality in the Mtkvari River that flows from Georgia into Azerbaijan. Greenhouse gas emissions are considered under transboundary impacts. There may be some transboundary migration of labour between Azerbaijan and Georgia but this is considered likely to be very limited.

11.3 Projects Overview

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. Information was requested regarding the location of other planned developments within a 10km corridor of the proposed SCPX Project pipeline, facilities and CSG2 access road from the Ministry Of Economy and Sustainable Development (MoESD), Ministry of Environment Protection (MoE), Ministry of Regional Development and Infrastructure (MoRDI), Ministry of Energy and Natural Resources (MoENR) and the Ministry of Agriculture. 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. Relevant information provided has been used to inform this Chapter.

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 discusses 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.

11.3.1 Other Developments in the Project Area

The SCPX Project area mainly comprises land used for agriculture, but a number of existing developments could have environmental and social impacts in the SCPX Project area, including:

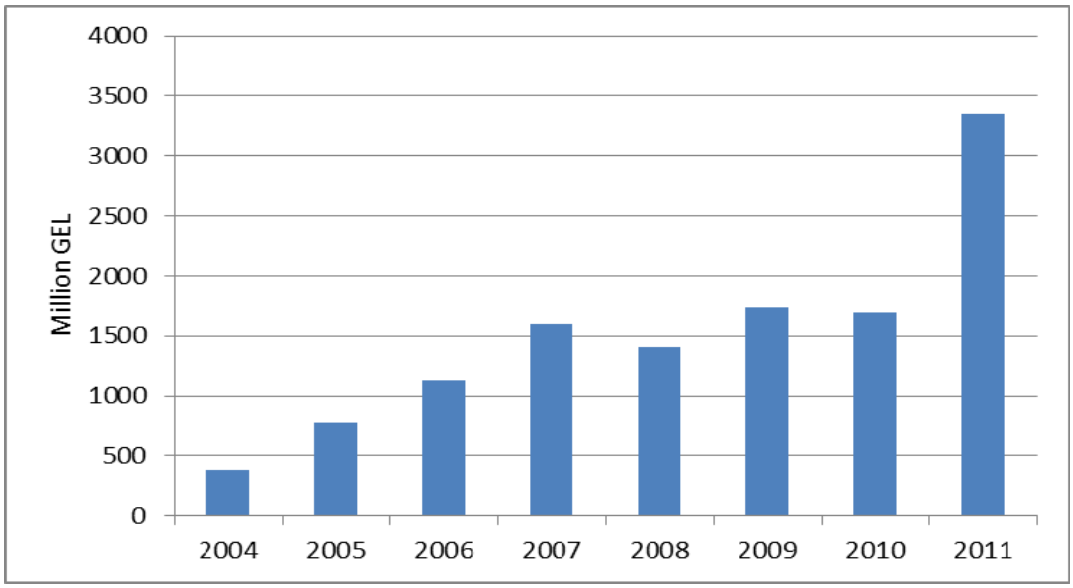
- Oil and gas pipelines:
  - BTC and WREP oil pipelines
  - SCP gas pipeline
- Industrial facilities
  - Gardabani gas-fired power stations
  - Rustavi Azot chemical plant
  - Rustavi metallurgical plant steel mill
  - Rustavi Heidelberg Georgia cement plant
  - Marneuli food factory
- Road and railway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

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

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

11.3.2 General Construction Activity

Between 2004 and 2007, Georgia experienced a sustained surge in construction (see Figure 11 1: Turnover of Georgian Construction Industry). Construction activity in the Project area could have a cumulative impact with the SCPX Project.



From Government statistics http://www.geostat.ge. Final figures for 2012 are not yet available

Figure 11-1: Turnover of Georgian Construction Industry

Although the rate of construction decreased by about 18% in 2008, in general the overall level of construction has been maintained and approximately doubled between 2010 and 2011 (http://www.geostat.ge), and there is therefore the potential for a considerable amount of construction activity and associated vehicle movements in the vicinity of the SCPX Project.

11.3.3 Oil and Gas Pipelines

It is proposed to build the SCPX pipeline mostly in the same pipeline corridor through Georgia that has been used by the BTC oil pipeline and the SCP gas pipeline. SCPX will run approximately parallel to the WREP oil pipeline as far as KP20 where the WREP pipeline diverges to pass north of Tbilisi. Along much of the SCPX pipeline route the soil has been disturbed by previous pipeline projects, and many PAC residents are likely to have greater awareness and previous experience of the visual impact, noise and dust that pipeline construction entails.

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, biorestoration 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.

SCPX compressor station CSG1 will be collocated with the BTC pump station PSG1. SCPX PRMS will be an extension of SCP Area 80, the existing pressure reduction and metering facility. The baseline noise and air quality monitoring presented in Chapter 7 has captured the noise and air emissions from the existing facilities and the noise and air quality modelling results presented in Chapter 10 take account of existing and new collocated process equipment.

The Georgian Pipeline Company (GPC) is planning to replace and re-route certain sections of the WREP pipeline originally constructed in the Soviet era and in proximity to landslides

and replace two new block valves and three river crossings. The most easterly of the sections is approximately 20km distant from the proposed SCPX route, so no significant cumulative impact on the SCPX Project area is expected. By extending the period in which pipeline construction is carried out in Georgia, the two projects could have cumulative social benefits in terms of employment and incomes.

11.3.4 Industrial Facilities

Many industrial plants operate in Rustavi city and the towns of Gardabani and Marneuli. The largest of these are the 110MW gas-fired power station at Gardabani, the mill at Rustavi that rolls 175,000 tonnes of steel per year, the chemical plant at Rustavi that produces 50,000 tonnes of industrial inorganic chemicals per year and the cement plant in Rustavi that produces approximately 1,000,000 tonnes of cement per year. These plants do not share a footprint with the SCPX Project, but they contribute to the industrial setting through which part of the SCPX pipeline passes and particularly to the baseline air quality to which SCPX will add its emissions. The baseline air quality measurements presented in Section 7.8 reflect the dispersion of atmospheric emissions from these facilities.

11.3.5 Energotrans's Vardzia HT Power Transmission Line

The route originally proposed for the 500kV Vardzia power transmission line, part of the Black Sea Regional Transmission Project that is currently under construction and is due for completion in 2012, crossed the site proposed for SCPX's CSG2 at KP142. For reasons of safety at the CSG2 facility and to accommodate the preferred CSG2 location, the Vardzia power transmission line is to be re-routed to pass north around the CSG2 site. The re-route will add 1km to the length of the transmission line and four extra pylons will be needed.

The cumulative impact is considered a small increase in the cumulative land-take for the two projects and a slight increase to the visual intrusion on views from the village of Rekha.

Transmission line construction will be completed before construction work at CSG2 begins.

11.3.6 Road, Railway and Port Developments

A considerable quantity of oil from Azerbaijan is transported by rail through Georgia on rail track that passes through Rustavi and Tbilisi. In 2007, Georgia, Azerbaijan and Turkey agreed the Kars–Tbilisi–Baku Railway Project, which will construct 29km of new rail track and repair 183km of existing rail track in Georgia. When the project is completed and commissioned, currently expected in 2013, it will be able to carry up to 15 million tons a year. A further proposal has been made to construct a railway bypass around Tbilisi so that trains transporting oil will not need to go through the city.

The SCPX Project will tunnel under the railway line on the east bank of the Mtkvari River, crossing it without interrupting the flow of rail traffic.

Assuming the railway projects are completed before the construction of SCPX begins, the SCPX may benefit by using sections of the upgraded track to deliver line pipe and process equipment from Poti port. Similarly, SCPX may benefit from the Ras al Khaimah Investment Authority's proposed project to develop 400ha of reclaimed land around the port of Poti to build a new port and a state-of-the-art free industrial zone with infrastructure in the form of roads and warehouses.

Construction of the Tbilisi-Rustavi Highway Project is anticipated to be undertaken between December 2012 – August 2014, however little information is available at this time. Construction traffic from SCPX and the highway project may lead to increases in traffic volumes in the vicinity of this road, however the current schedule for the highway project means it should be nearing completion when SCPX starts construction in this area.

The Millennium Challenge Corporation's Samtskhe-Javakheti Road Rehabilitation Project, aimed at constructing 224km of 8m asphalted road connecting poor regions in the south of Georgia to the capital city. The SCPX Project has designed the CSG2 Access Road to

connect with the Millennium Road; it will benefit from the latter when transporting construction materials and process equipment to CSG2. Together the CSG2 Access Road and Millennium Road will make it easier for communities west of Tsalka Lake to access the capital city, although the volume of traffic using these roads is likely to increase in part due to SCPX-related traffic in the construction phase.

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 and/or interactions that could occur as a result of the SCPX Project when considered in combination with other developments that are known and for which there is a reasonable level of information. Each potential cumulative impact is discussed in more detail in the following sections. Where sufficient information exists, the assessment of significance in accordance with Chapter 3 is also included.

Table 11-1: Potential Additive Impacts

Aspect	Oil and Gas Pipelines	Industrial Facilities	Vardzia Power Line	Roads, Railways and Ports
Natural resources				-
Soil	-		-	
Landscape			-	
Water resources	-	-		
Ecology	-		-	
Air quality	-	-		-
Noise and vibration	-			
Cultural heritage	+			
Employment and skills	+	+	+	+
Livelihoods	+	+	+	+
Community health and safety			-	
Traffic				
Unplanned events				

Impact Type Key

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

11.4.1 Use of 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 SCPX Project will need approximately 500,000m^3 of aggregate to raise the site of CSG1 for flood protection, 250,000m^3 of aggregate for earthworks at CSG2 and the access road, 50,000m^3 of

aggregate for earthworks at the PRMS and 50,000m^3 for earthworks at the pipeline construction camp. The 56" pipeline aims to avoid importing padding material by the selective use of material from trench excavation. To meet the general demand for aggregate, the SCPX Project may need new borrow pits or quarries to be opened, but Georgia has many locations suitable for quarrying, so this will not significantly deplete the availability of aggregate for other projects in the future. Only very limited amounts of aggregate are likely to be required for ongoing maintenance of the existing pipelines.

Use of natural resources by a number of projects could lead to a potential negative cumulative environmental impact.

11.4.2 Soils and Ground Conditions

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.

The re-route of the Vardzia power transmission line around the CSG2 facility will need four pylons with a footprint of 0.16ha. There is the potential for a negative cumulative impact on soil conditions associated with these two projects, however they are considered to be small..

11.4.3 Landscape

The existing industries around Rustavi dominate the character of the surrounding landscape. Landscape modelling of the SCPX facilities suggests that the CSG1 facility is likely to appear as an extension to the BTC pipeline's PSG1 facility, with little change to views from nearby communities once landscape mitigation has been implemented. The PRMS will have a similar landscape impact to the existing SCP Area 80 facility.

Landscape modelling has been undertaken for both the CSG2 facility and the Vardzia transmission line which will be constructed in the vicinity of CSG2. The modelling suggests that the visual impact of the Vardzia transmission line and the CSG2 facility on views from Rekha village will have a negative cumulative visual impact, which is considered to be of medium significance.

11.4.4 Water Resources

The SCPX Project will need to extract approximately 88,000m^3 of water from rivers and lakes for pipeline hydrostatic testing and 4000m^3 for testing to commission the facilities. Existing industries around Rustavi and agricultural irrigation systems that supply their routine water demands from these surface waters, could contribute to a cumulative reduction in river flows or the water level in lakes. It is not known which existing or planned projects abstract water from the surface waters that SCPX would use, so while there is a potential negative cumulative impact, it cannot be quantified and assessed at this stage.

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.

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. Groundwater abstraction is likely to occur for construction and operational water supply and at the facilities which are collocated with the existing BTC/SCP facilities (i.e. CSG1 and the PRMS), the potential for negative cumulative impacts exists. This impact will be however be assessed and mitigated in accordance with the measures proposed in Section 10.6.4.

11.4.5 Ecology

At CSG2, the area in which the Vardzia power transmission line will be re-routed has the same sub-alpine meadow habitat and species composition as the CSG2 site. The Vardzia transmission line will not remove a significant amount of the subalpine meadow habitat and the construction of CSG2 will add to the amount of subalpine meadow that is removed. There is the potential for a negative cumulative impact, however it is considered that the assessment of a medium significance residual impact on ecology for the CSG2 site alone would not be increased due to the additional habitat removal associated with the Vardzia transmission line.

The ESIA Addendum for re-routing the Vardzia transmission line around the CSG2 site assessed its impact on avian fauna as being of moderate significance, particularly with regard to secondary migration route for birds that follows the Ktsia River. Taking the cumulative impact with CSG2 into account, the assessment is considered to remain valid.

Where maintenance work is taking place at river crossings on the BTC and SCP pipelines, there is the potential for a negative cumulative impact on ecology at river crossings.

11.4.6 Air Quality

Four of Georgia's nine largest stationary sources emitting atmospheric contaminants are located around Rustavi. In 1992 Gardabani Power Plant, Rustavi Metallurgical Factory, Rustavi Cement Plant and Rustavi Azot chemical plant emitted more than half of the national emissions (http://enrin.grida.no/htmls/georgia/soegeor/english/air/indpoll.htm). More recent figures are not available, but industry has declined since the soviet era and Georgian emissions are at significantly lower levels than before. However, the air quality monitoring at locations around CSG1 that are reported in Section 7.8 are indicative of the current concentrations of atmospheric pollutants from these sources and from other sources including the BTC pipeline's PSG1 pumping station.

The air quality modelling for the SCPX ESIA presented in Section 10.8.3 predicts the concentration of pollutants including the background levels. The modelling used annual average concentrations of 5µg/m^3 for NOx and 0.5mg/m^3 for CO to represent the baseline air quality at CSG1, and predicted the areas in which the concentration of pollutants emitted from CSG1 and PSG1 would be above the baseline when SCPX becomes operational. The background level was derived from surveys prior to the construction of PSG1 to avoid double counting these emissions within the background and the modelling. The background level used in the modelling may have slightly under-estimated NO_2 emissions from other local sources that have either been installed since the construction of PSG1 or have increased their output significantly since 2002. However, if the highest measured annual NO_2 concentration from the SCPX baseline survey that captures current emissions from other sources is applied to the modelling results for the farmhouse to the north of PSG1, CS1-1 (18.1 µg/m^3, a summer result that is likely to overestimate the annual mean), process contributions from SCPX would increase this by a negligible amount (to 18.38µg/m^3). The cumulative impacts of other industry operating in the area have been captured by evaluating current background NO_2 concentrations with the addition of predicted process contributions from PSG1 and CSG1, which is a conservative approach. This impact is still assessed as having low significance as per Section 10.8.3.

Construction of the Vardzia transmission line does not have the potential to affect air quality significantly, but construction in general raises dust from earthworks or vehicle movements, and if any other, as yet unidentified, construction projects are carried out close to SCPX pipeline and facility construction sites, there could be some additional dust in the atmosphere or the duration of increased dust concentrations could be longer. Dust can cause nuisance to nearby residents and could potentially lead to reduced crop productivity or honey production, or, in extreme cases, increased respiratory problems. There could be potential negative cumulative impacts from dust generated by other construction projects, however the effects are likely to be very localised.

11.4.7 Noise and Vibration

In order to contribute to a cumulative noise impact, activities would need to be located closely and happening at the same time. The other developments that have been identified will not, as far as information available confirms, coincide with the SCPX Project in this way, except for the operation of the existing BTC pump station PSG1 and operation of the SCP Area 80 pressure reduction station.

The noise monitoring carried out for the SCPX baseline (see Section 7.9) noted that the existing PSG1 facility contributes to noise levels at the two nearest receptors (i.e. CSG1-N1 and CSG1-N3), and it is considered as part of the baseline noise environment. The noise levels predicted by modelling (see Figure 10-9) are lower than the existing measured noise levels at these two receptors. Cumulatively, noise from PSG1 and CSG1 would exceed 42 dB(A) at both CSG1-N1 and CSG1-N3. However, because the cumulative noise levels at receptors is not expected to exceed the existing background noise levels by more than 3 dB (a change which is considered to be only just audible), the noise assessment in Section 10.9.3 is also valid as an assessment of cumulative noise impact. The cumulative impact for noise is therefore assessed as having medium significance.

The existing developments and any new projects will use the same road networks that the SCPX uses for logistics and transport. It is considered unlikely that construction vehicles from other projects will be using the same village roads at the same time as those for SCPX Project, but this cannot be precluded. 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. Potential negative cumulative impacts from vibration could arise, the significance of which will vary depending on the vulnerability of individuals to vibration and the frequency and volume of traffic movements.

11.4.8 Cultural Heritage

During construction of the existing BTC and SCP pipelines, a robust and systematic programme of cultural heritage management was followed and features were identified that could extend into the route of the 56” pipeline (see Section 7.10). This management approach is also proposed to be adopted by the SCPX Project. Pre-construction surveys and excavations of known sites in the vicinity of the Project pipeline, facilities and CSG2 access road, will be carried out to increase understanding of the sites. Their contribution to knowledge of the archaeology within the area will have a potential beneficial cumulative impact.

Ongoing maintenance work on the BTC, SCP and WREP pipelines 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.

11.4.9 Employment and Skills

The existing developments are important employers, and each new project gives temporary employment to a construction workforce and provides training opportunities that increase the local skills base. In an area with a history of relatively high unemployment, new projects bring significant social benefits in terms of continuing employment. The concurrent construction of any of the projects will increase the number of jobs available to the local population, which should have a synergistic, beneficial impact.

Construction of previous oil and gas pipelines means that there are workers locally who may have the necessary skills to work on the project. Training that will be offered to the SCPX workforce will further enhance this legacy.

11.4.10 Livelihoods

The potential for cumulative impacts on livelihoods is considered to be very localised. The 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.

The SCPX Project may affect the livelihoods of people who own or use land that is temporarily used for pipeline or facility construction (Project Affected People). Some of these may be the same people who could be affected by maintenance activities on the existing BTC, SCP and WREP pipelines. However, as these pipelines have established compensation policies for ongoing impacts from operational maintenance activities, there are predicted to be no significant cumulative impacts.

11.4.11 Community Health and Safety

Taken together, the BTC, SCP and SCPX Projects will act beneficially to raise awareness of safety issues, both through training of personnel involved in the projects and by supplying information to PACs.

No other projects will be carried out simultaneously within the physical footprint of the SCPX Project during the construction phase, so construction sites have no adverse cumulative impact on community health and safety.

At CSG2, SCPX construction occurring shortly after the Vardzia transmission line has been completed would have the effect of lengthening the period for which PACs are exposed to disturbance and the risk of accidents. In other areas, concurrent construction activities in the locality of the SCPX Project will be expected to be increase traffic movements (Section 11.4.12). This could cause a small increase in the risk of accidents associated with increased vehicle movements. There is considered to be the potential for a negative cumulative impact on community health and safety which is expected to be of low significance.

The cumulative impact on community health of dust raised by various projects is discussed in Section 11.4.6.

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

11.4.12 Traffic

The 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 potential negative cumulative impact in terms of temporary congestion or an increased risk of accidents.

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 11.4.7. Impacts on air quality, including dust, from increased traffic movements are considered in Section 11.4.6.

11.4.13 Unplanned Events

New developments are not permitted within a defined distance from the SCPX pipeline or facilities in accordance with Georgian 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 56” pipeline will be buried. Risk assessment studies have been carried out to establish normal separation distances

between the pipelines that 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.

Perimeter walls surround the SCPX facilities and exclusion zones surround the vent stacks. The Vardzia transmission line will be routed a sufficient distance from CSG2's vent stack to prevent ignition of vented gas. This rules out a cumulative impact with the nearby third-party facilities.

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.

11.4.14 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. 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	+	+	-	-
Existing pipeline facility operation	+	-	-	-
Road and rail developments	+	+	-	-
Vardzia Power Line	+	-	-	-

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 the potential interactions using available information and professional judgement 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 mainly on the situations where adverse residual impacts of medium significance and above and/or beneficial effects were recorded in individual topic areas for the construction and operation 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 pipeline ROW and AGIs, the facilities, CSG2 access road, construction camps and laydown yards, and wider settlements and communities/PACs).

The significant in-combination impacts (i.e. those with a medium residual impact significance) are considered to be mainly restricted to the construction phase. The assessment reviewed the properties/communities in close proximity to the to the proposed ROW and facility construction sites who will potentially experience a combination of temporary effects associated with increased noise, vibration, localised dust generation, visual intrusion and potential degradation of air quality due to the number and proximity of the vehicle movements while construction is being undertaken in that area. The area where these in combination impacts have been identified as a potentially significant issue, where dwellings are in close proximity to the ROW is: Krtsanisi village (KP40). There is also expected to be an increased number of vehicles on local roads during the construction phase of the Project. The effect will 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.

In-combination impacts of a lower significance (due to increased proximity from the Project leading to a low residual impact significance) may potentially be experienced by communities close to the construction camps, pipe yard and access roads. These communities are considered likely to experience a similar combination of temporary effects to those experienced by properties/communities along the pipeline route. The areas where these combination impacts have been identified as a potentially significant issue where dwellings are in close proximity to the camps, pipe yard and CSG2 access road are: Poladaantkari construction camp, CSG2 access road construction camp near Aiazmi and Nardevani and the communities of Berta (where buildings are close the access road), Bernasheti, Kuschi and Nardevani where the road is being routed close to existing access tracks.

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

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

Location	Air Quality	Noise and Vibration	Traffic	Livelihood	Landscape and Visual	Community Safety
Krtsanisi Village (KP40, Pipeline)						
Communities close to the CSG2 access road Berta, Bernasheti, Kuschi and Nardevani						
Communities close to camps at Polaandtkari, Aiazmi and Nardevani						
Landowners and tenants along the CSG2 access road and KP1-12						

Dark green cells indicate the potential for significant in-combination effects; Light green cells indicate the potential for in-combination effects.

Landowners and tenants of affected landholdings may be subject to a combination of localised disruption to their current agricultural regimes including in-combination 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 relatively 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 limited to and limited to visual impact (permanent presence and night time lighting), slight local air quality degradation, and slight increase in ambient noise from the facilities. These impacts are considered to be of low significance given that CSG1 and PRMS sites have been collocated with existing facilities and the CSG2 site is a considerable distance from local communities. No significant in combination effects are anticipated.

11.6 Assessment of Transboundary Impacts

While this ESIA focuses on the Georgian section of the 56" pipeline and the facilities that are proposed to be constructed in Georgia, SCPX is also an international project. It will transport gas from the country in which it is produced (Azerbaijan) 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 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 Mtkvari River can convey potential contaminants from sources in the SCPX Project area in Georgia to sensitive receptors in Azerbaijan. Secondly, Project emissions of air pollutants could, depending on dispersion, have transboundary impacts. Emissions of greenhouse gases will also occur.

11.6.1 Mtkvari River

The Mtkvari River flows from Georgia southeast of Gardabani into Azerbaijan, where it crosses the country and enters the Caspian Sea south of Baku. In the unlikely event of an accidental spill occurring from the SCPX Project into the Mtkvari River, it could affect fish stocks and downstream users of the water in Azerbaijan. The SCPX Project proposes to micro-tunnel under the Mtkvari River without affecting its water quality. Abstracting hydrotest water from the Mtkvari at a controlled rate is unlikely to have a serious effect on downstream users in Azerbaijan. Before discharging hydrotest water into the Mtkvari, the Project will test the water to confirm that it will not contaminate the river for downstream users.

The Algeti River flows into the Mtkvari River. Sediments disturbed when the SCPX Project constructs an open-cut crossing of the Algeti River are expected to settle back to the river bed long before it reaches the confluence with the Mtkvari.

If an fuel oil spill during construction of the 56" pipeline polluted 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 border with Azerbaijan for the effects of a spill on water quality in the Mtkvari River to be resolved before the water reaches the border. The significance of potential transboundary impacts in Azerbaijan due to changes in river water quality is considered very low.

11.6.2 Atmosphere

Combustion of diesel fuel and fuel gas emits gases that can affect air quality. Some greenhouse gases will also be emitted.

Atmospheric pollutants

CO emissions are associated with the formation of smog and ground-level ozone and can cause health issues, with people suffering from existing respiratory problems being particularly sensitive. In the small area of Azerbaijan where an increase in CO levels might be detectable (see Figures 10-5 and 10-7), there is not currently any identified issue with smog and ground-level ozone, so no transboundary impact is expected.

The potential for NO_x and SO_x to give rise to transboundary impacts depends on the residence time, the behaviour of the gas once released to the atmosphere and the speed and direction with which the wind displaces it from its source. The residence time of most gases in the atmosphere following release is only one or two days.

NO_x and SO_x undergo transformation to nitric acid and sulphuric acids in the atmosphere and precipitate as acid rain that stresses ecosystems and damages limestone structures.

The SCPX's largest static source of NO_x emissions is the combustion of fuel gas at CSG1 and CSG2. Modelling the atmospheric dispersion of NO_x from CSG1 (see Figures 10-6 and 10-8) shows that the area where peak NO_x is predicted to exceed 15ug/m^3 barely crosses the border. Annual average NO_x does not cross the border at levels over 2.5ug/m^3. These levels plus the existing backgrounds, give totals which are far lower than the WHO health and EU ecosystem limits (used for benchmarking purposes only) and suggest that it is unlikely that the emissions would cause health impacts to people in Azerbaijan. It is not anticipated that the NOx will lead to noticeable stress upon sensitive ecosystems downwind of CSG1 in Azerbaijan.

SO_x will only be emitted from diesel engines, such as mobile off-road construction plant and vehicles, or from emergency power generation. The concentration of gases released from diesel engines is expected to be too small to have a significant transboundary effect.

The modelling carried out for the PRMS predicted that the area experiencing elevated concentrations of NO_x would be very local to the facility itself and that annual average NO_x at concentrations over the current background levels would not cross the Turkish border.

The transboundary impacts from changes to air quality are therefore expected to be of low significance.

11.6.3 Greenhouse Gas Emissions

Specific emissions of greenhouse gases are not directly linked to local impacts but 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. Fugitive emissions from flanges and connections, as well as maintenance and emergency venting, at the SCPX facilities will result in the release of methane as the main component of natural gas.

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 will result in approximately 4,000 tonnes of indirect CO_{2eq}/yr owing to the electricity imported from the Georgian grid, based on the current generation mix.[1]

The International Energy Agency (IEA, 2011) states Georgia's national CO_2 emission at 5.7 million tonnes in 2009, and the SCPx would increase the national CO_2 emission by around 11% including both direct and indirect emissions. SCPX is an international project that will transfer gas to European energy markets, rather than to Georgian consumers. 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 greenhouse gas emissions.

Benchmarking the energy consumption and greenhouse gas 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.

[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)

A US National Energy Technology Laboratory (Skone et al., 2011) study looked at the lifecycle of US natural gas from various sources. The study observed that the greenhouse gas 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, it 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 0.0% in venting and flaring). The transportation distance in their study is 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).

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 greenhouse gas 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, it would emit 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).

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

Emitted Greenhouse Gas	Theoretical Emissions if SCPX Throughput was in US System (and 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) = 1,753,000	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.

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.