

**ENVIRONMENTAL AND SOCIAL
IMPACT ASSESSMENT**

**South Caucasus Gas
Pipeline Azerbaijan**

Prepared for BP

By AETC Ltd / ERM

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GENERAL NOTES

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This work has been undertaken in accordance with the Quality Management System of AETC.

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1 EXECUTIVE SUMMARY

1.1 INTRODUCTION

The expansion of natural gas production is currently underway in Azerbaijan, particularly with the development of the Shah Deniz field. The domestic demand for gas in the Caucasus and Central Asia is mostly met by current supplies and is unlikely to grow significantly in the near future. The Government of Azerbaijan has negotiated a gas sales and purchase agreement with the Government of Turkey to supply Shah Deniz gas to Turkey by the end of 2005 and the South Caucasus Pipeline (SCP) project has been designed to facilitate gas transport. At full capacity, and after additional stages of development, it is envisaged that the pipeline will export up to 16bcm/year from the existing Sangachal Terminal near Baku in Azerbaijan, through Georgia to the Georgian-Turkish border. The SCP will link up with a pipeline being constructed within Turkey to transport the gas to Erzurum, where it will enter the domestic supply grid. Additional sales and purchase agreements are also in development with the Governments of Azerbaijan and Georgia.

The SCP pipeline is owned by a set of companies who are referred to in this document as the SCP partners. BP is the largest stakeholder in the project and is leading the design and construction phase of the project. Other SCP partners currently include the State Oil Company of the Azerbaijan Republic (SOCAR), Statoil, TPAO, LUKAgip NV, Total-Fina-Elf and NICO. The SCP partners will be responsible for construction and operation of the proposed pipeline in both Azerbaijan and Georgia.

This document summarises the Environmental and Social Impact Assessment (ESIA) of the SCP pipeline project in Azerbaijan. The analysis covers impacts for the lifetime of the project, ie construction, operation and decommissioning.

The ESIA has been conducted to meet international standards and guidelines (including those of the World Bank Group), Azerbaijani legislation, and BP corporate policies. It also fulfils the requirement in the Host Government Agreement for the development of an EIA. Figure 1-1 illustrates the ESIA process followed for SCP.

1.2 CONSULTATION AND PARTICIPATION

As can be seen from Figure 1-1, consultation and participation have been central elements during each phase of the ESIA process. This has involved the following groups during both baseline data collection and the development of mitigation measures:

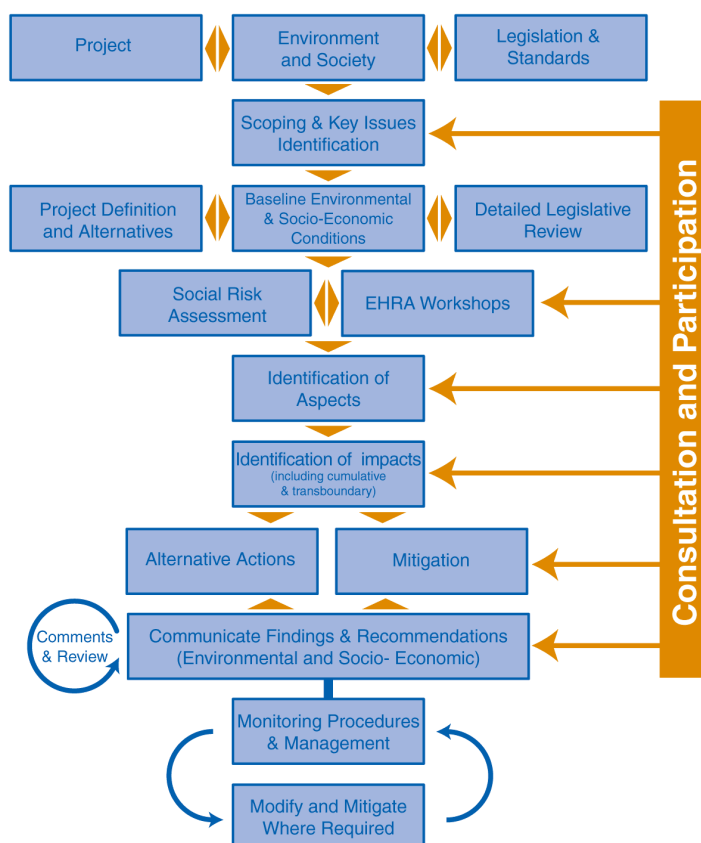
- Communities along the route
- Government departments
- Academics
- International and national non-governmental organizations (NGOs)

Representatives of all communities within 2km of the pipeline route and additional facilities have been consulted. A Public Consultation and Disclosure Plan (See Part 5 of Technical

Appendices) has been developed that includes further information on the past and future consultation activities, and stakeholders consulted.

This draft of the ESIA document has been prepared specifically for public disclosure and comment. The report will be widely disseminated and will be available for comment for a period of 60 days. Following the 60-day disclosure period all comments received will be incorporated as appropriate into the ESIA, prior to formal submission to the Government.

Figure 1-1 The SCP ESIA process



1.3 PROJECT ALTERNATIVES

A primary driver for the SCP gas export route was the market for gas. Unlike oil, which is sold onto an open market, gas sales are tied to a specific delivery point typically underpinned by gas sales and purchasing agreements. Once the gas sales and delivery point had been agreed an assessment of alternative export options was undertaken. The assessment was a phased process, starting with a consideration of the best method for transportation of the gas, followed by a comprehensive assessment of the best corridor for a pipeline and then looking in great detail at the exact route alignment within that corridor.

Pipelines are universally accepted to be the safest, most cost effective and environmentally sound method of transporting gas. The main risk of pipeline damage is from third parties and there is scope to minimize this risk (and others) as far as possible by careful pipeline routing, design, monitoring and management.

When refining the pipeline route within Azerbaijan, first to a 10km wide corridor, and subsequently by a staged approach to a 32m Right of Way (ROW), a number of issues had to be considered, including:

- Environmental risk
- Designated areas
- Social impacts and proximity to settlements
- Constructability and engineering constraints
- Security
- Proximity to other projects such as the existing Western Route Export Pipeline (WREP)
- Use of existing infrastructure corridors

As a result, a shared route for SCP and a new oil pipeline (the Baku-Tbilisi-Ceyhan or BTC) has been selected, which runs parallel to the WREP for most of its route through Azerbaijan. Where significant deviations from the WREP route occur these have often been incorporated to reduce the environmental impact of the project. This is reflected in route changes in the Gobustan Desert region, and in re-routes to avoid the Korchay and Shamkir State Forbidden Areas.

As part of the process of assessing alternatives to the project, the option of “no-development” was considered. However, the potential positive socio-economic benefits of the pipeline (including government revenue and local employment opportunities) and associated environmental risks of not developing the project (including development of alternative LNG exports, or gas by wire) were considered to outweigh the potential negative environmental and social impacts that will result from the construction and operation of the SCP pipeline.

Considerable effort has also gone in to optimizing the design of the pipeline system to maximize its operability, minimize its cost and minimize environmental impact where practical.

1.4 PROJECT DESCRIPTION

The complete SCP pipeline, which will be buried for its entire length, will total 690 km in length, divided as follows:

- Azerbaijan 442km
- Georgia 248km

Within Azerbaijan, the SCP pipeline system will principally include:

- Gas supply infrastructure and pig launching facilities at the Sangachal Terminal (all of which have been included within a separate ESIA)
- Valve stations
- A cathodic protection (CP) system
- A fibre optic communications system

- A computer-based control system

The pipeline route is shown in Figure 1-2.

Figure 1-2 SCP Route



1.4.1 Schedule

Key milestones for the SCP project in Azerbaijan are shown in the table below.

MILESTONE	APPROXIMATE TIMING
Award of construction contract	3Q 2002
Start upgrade of pipe storage yards (in conjunction with BTC)	3Q 2002
Start of pipelay	1Q 2004
Finish of pipelay	2Q 2005
Commissioning	4Q 2005

1.4.2 Construction

An experienced international contractor, under close supervision of the SCP partners management team, will carry out construction of the pipeline.

The contractor will use one or more conventional construction spreads for normal pipeline installation, and one or more special section crews for river crossings and other specialised pipe segment installations.

Initially the pipeline construction corridor will be marked, prior to clearing and levelling. Generally topsoil is stripped and stored to one side of the corridor, and separately from subsoil.

The pipeline trench will be excavated to approximately 2.2m, allowing the pipeline to be buried with a minimum depth of cover of 1m. Deeper burial may be required at river, road, rail and other crossings.

Pipe sections will be transported to the construction corridor by truck and laid end-to-end alongside the open trench. The pre-coated pipe sections are then welded together and a further protective coating applied to the welded joints. The coating is tested to ensure it will provide adequate corrosion protection before the pipe is lowered into the trench.

The trench is then filled with the material taken from the trench, in the reverse order to which it was excavated. The cover material is compacted to reduce the risk of future settlement and erosion.

The construction corridor and all other project areas will be reinstated, either fully or using interim measures if required for imminent gas pipeline construction. Reinstatement will include erosion control measures and re-vegetation.

The integrity of the pipeline is tested by filling discrete sections with water and increasing the pressure.

The construction of the pipeline will also require a number of temporary facilities, including construction camps for workers and pipe storage yards.

1.4.3 Operation and maintenance

The pipeline system has been designed to require minimal operational and maintenance intervention. Safety of employees, customers and the general public, and environmental performance will remain priorities during this phase. A system of regular inspection and maintenance will be developed and implemented for the pipeline and associated facilities.

Training programmes will be developed for all operations staff.

1.4.4 Decommissioning

As part of decommissioning all hydrocarbon products will be removed from the line. Once cleaned, it is generally preferable to leave the abandoned line in place as this avoids the environmental disturbance associated with removal. It may be necessary to maintain the cathodic protection system to prevent corrosion of the pipeline, which could lead to subsidence.

The option of using the pipeline for the local/national distribution of low-pressure gas, the transportation of water or as a conduit for services such as telecommunications cables, may also be considered.

1.5 BASELINE DESCRIPTION

1.5.1 Environmental baseline and identification of issues

The environmental characterisation of the pipeline route has included analysis of the following issues:

- Ecology (flora, fauna and biodiversity)
- Water resources (surface and groundwater)
- Geology and geomorphology
- Landscape and land use
- Climate and meteorology
- Archaeology and cultural heritage
- Traffic and transportation infrastructure
- Air quality
- Noise
- Contamination
- Soil erosion

The sections below summarise the key findings for each of the above issues.

Ecology

The proposed route is characterised by very diverse ecological conditions and by abundant biodiversity. The key issues relating to habitats, flora and fauna along the pipeline route are:

- Artemisia and Salsola deserts of the proposed Gobustan National Park
- Potential presence of the red data book listed plant *Iris acutiloba* in desert habitats
- Potential presence of the red data book listed plant *Merendera trigyna* in desert habitats
- Presence of the IUCN classified Mediterranean tortoise, *Testudo graeca*, in many locations
- Presence of several ground nesting birds of conservation importance at various locations

Water Resources

The proposed route crosses 20 major rivers and a number of important canals.

Key issues relating to hydrology along the route of the pipeline are:

- The two crossings of the Kura River, the major river in Azerbaijan
- The highly seasonal flow regime of many of the rivers crossed
- The high sediment load of many rivers crossed
- Poor channel stability of rivers such as the Djeýrankechmes, Shamkirchay and Kura East
- Ecological value of certain rivers, particularly the Kura, Korchay and Hasansu

Geology and Geomorphology

The pipeline route in Azerbaijan is located in a depression (the Kura River Valley) within the southern extension of the Great Caucasus mountain range. The regional structure is dominated by compressed sedimentary rock.

The route is also close to areas of land instability and the region generally exhibits high seismic activity. These geohazards have been fully considered in the route selection process and therefore only minor instances actually affect the current route.

Key issues in terms of geology and geohazards along the pipeline route are as follows:

- The majority of the pipeline route is underlain with relatively soft sediments that can be easily excavated
- Azerbaijan is situated in the seismically active Caucasus region and experiences frequent earthquakes. However the pipeline route itself is situated mainly within the less seismically active Kura River plain
- The pipeline route crosses four seismically active fault zones
- The pipeline route crosses an area in the vicinity of active mud volcanoes

World-renowned specialists have advised on how the risks from these geohazards should be mitigated in the pipeline design.

Landscape and land use

Landscape and land use along the SCP pipeline route are mainly determined by the combination of relief, climate, geology, topography soils and hydrology.

A number of distinct regions can be identified along the route, including the arid, desert regions at the east of the route, and the fertile agricultural lands of the Kura Plain.

The value of the landscape varies according to the degree of human impact, which has resulted in degraded landscapes in many regions. Activities impacting upon visual amenity include civil and industrial construction, military activities, power infrastructure, mining, waste disposal, and deforestation.

Climate and meteorology

Numerous climatic types are found in Azerbaijan, depending on altitude and distance from the Caspian. Dry subtropical climate is typical in the Kura river valley where the majority of the SCP pipeline route is located. The highest air temperatures occur at the eastern end of the pipeline and along the Caspian coastline. In this region average July temperatures are more than 25°C, whilst during the winter temperatures rarely fall below freezing. The average annual temperature is 15°C. Average rainfall is 200-400mm per year but can be as little as 150-200mm in semi-desert areas such as Gobustan.

The weather is cooler and wetter in the west, towards the border with Georgia.

Archaeology and cultural heritage

Azerbaijan is rich in evidence of previous occupation. Most stages of human development have been encountered at archaeological sites in the country. The proposed SCP pipeline route crosses several areas of archaeological interest and areas where potential additional finds could occur during excavation works.

Field studies have identified areas of particular interest and a series of pre-construction archaeological surveys will be conducted to further define the archaeology of these areas.

The pipeline route also crosses the north-eastern edge of the Gobustan Cultural Reserve, for a total distance of 900m. However, the pipeline will have no impact upon any of the rock art that the Reserve is designated to protect.

Traffic and transportation infrastructure

The road network in Azerbaijan has suffered from a lack of investment, with many roads in a poor condition. Many roads also have poor signage, limited lighting, a lack of markings, crash barriers and other safety infrastructure. The key issue associated with the SCP project will be the increase in traffic and therefore in traffic safety risks in some areas.

Air quality

Information on air quality along the route was generated by desk based assessment of historical data from various locations. This data was supplemented by on-site monitoring of air quality, and subsequent modelling of emissions, at the proposed pump station location.

The results of this assessment show that baseline air quality in these areas is good, and is likely to be typical of the rural and urban areas encountered on the pipeline route.

Noise

The SCP pipeline is routed almost entirely through quiet desert, semi-desert and rural areas where ambient noise levels, particularly at night, can be expected to be low or very low (typically less than 20 dB(A) at night). However, background noise levels can be significantly higher during periods of strong winds, with levels typically in the range of 45-55 dB(A).

A background noise survey undertaken in 1996 in the Sangachal area, prior to the construction of the existing terminal facilities, revealed generally high noise levels of up to 55 dB(A). The levels measured are considered typical of a windy coastal location near to road traffic in Azerbaijan.

Contamination

Areas of visible contamination have been identified along the pipeline route. Sites that currently fall within the proposed construction corridor include instances of waste dumping, some asbestos tiles, minor areas of oil staining and scrap metal.

From the SCP project perspective the key baseline contamination issues are:

- Minimising risks to worker health and safety, particularly during construction
- How to treat and/or dispose of contaminated material from the pipeline corridor.
- Clearly documenting pre-existing contamination so that the SCP project is not assumed to be responsible for contamination that in fact pre dates the project

Soil erosion

While much of the SCP pipeline route is in areas that have little tendency for soil erosion there are a number of areas that are prone to high levels of soil erosion. Soils with a high clay and silt content are particularly prone to erosion.

1.5.2 Socio-economic baseline and identification of issues

Baseline socio-economic information for the ESIA was collected in consultation with members of communities within 2km of the pipeline route, and covers both existing conditions and attitudes to the SCP pipeline. Communities within 2km of pipe yards were also consulted. A total of 73 interviews were held with community leaders and 814 with community members.

Population and area of study

A total of 83 communities have been identified as being located within (or partly encroaching into) a 4km corridor centred on the route, or are close to a potential construction camp or pipe yard. The total population of all the communities surveyed is 257,223, of whom just over 96% are permanent residents, 0.3% temporary residents, and 3.3% IDPs and refugees. Communities are, in general, ethnically and religiously homogenous (Azerbaijani muslim).

Infrastructure

Access to reliable sources of energy is a major concern for these communities. 84% of communities stated that they receive infrequent electricity supply, and 58 communities are currently receiving no gas supply.

Water supplies are problematic for all surveyed districts. 73% of communities in the survey area have no communal piped water supply and obtain their water mainly from canals. Water is also essential in most areas for agricultural irrigation.

There are almost no active refuse or sewerage systems in the surveyed communities.

Many services, such as fire departments and banks are virtually non-existent along the route, while other services such as police services and health clinics have suffered from a lack of investment.

Land Tenure

The majority of people rely on the land for subsistence, particularly as industrial activity along the route has dwindled. Land is used mainly for crop cultivation and grazing of livestock. 86% of communities are engaged in vegetable cultivation, 57% in growing grain and almost all of them in small amounts of animal husbandry. Many households own one or two cows and a small number of sheep and poultry for subsistence purposes (wool, milk and meat). During the winter season, municipal and state land is also used by migratory sheep-herders for grazing their animals.

The land privatization process began in late 1996 and has progressed rapidly. 95% of people interviewed have direct ownership or use of land. IDPs and refugees tend to use State or municipal land.

Employment

There is generally a high level of unemployment along the route. All communities surveyed stated that they had members who would be available for temporary work. Communities also reported that there were members of their community with skills they felt would be of interest to the project, eg engineers, drivers and welders. Communities close to potential construction camps also reported the availability of workers experienced in catering, laundry, cleaning, food production, etc.

In 2000, the national average income was 203,400 manats per month (US\$46). In rural communities along the pipeline route incomes are considerably lower than this national average.

Crops and animal husbandry are the main sources of cash income along the pipeline corridor. This income is supported by the following sources:

- State sector employment, eg teachers, doctors, and government posts
- Material aid - provided by international NGOs and the State
- Social transfers - state pensions, benefits, etc
- Hunting, fishing and gathering
- Trade - including local shops and businesses (70% of communities have at least one shop or market)

Attitudes to the SCP Pipeline

Nearly 80% of the communities surveyed have previous experience of the construction process for either the Azerigaz pipeline or WREP and therefore have some idea of what to expect from the SCP project. In general, the overall attitude to the project was positive but cautious, with 68% indicating that they thought the construction and operation of the pipeline would be beneficial. Employment was by far the most important perceived benefit. All respondents felt strongly that local people should be offered first refusal for jobs for which they were qualified.

1.6 MANAGEMENT OF IMPACTS

1.6.1 Management of environmental impacts

An assessment has been made of both generic and location specific environmental impacts, as defined below.

Generic impacts are defined as those that could occur at any geographical location, as they are related to the activity rather than being dependent upon the environment.

Location specific impacts are defined as those that could occur in one specific geographic location, due to a particular sensitivity at that location.

Mitigation measures have been developed for each type of impact. The likelihood and significance of each impact occurring, after mitigation, has been determined.

The most effective mitigation measure for a pipeline project is to ensure that the route is selected to minimise environmental impact. For the SCP pipeline project this has involved re-routing to avoid sensitive areas, protected areas, archaeological sites and geohazards, and the sensitive siting of facilities.

Knowledge of environmental constraints has also enabled the engineering team to select the most suitable construction techniques and design features to further minimise impacts.

The table below provides an outline of the mitigation measures that will be applied to manage the environmental impacts associated with:

- General construction and operation activities
- Construction camps and storage yards
- Construction of crossings
- Testing and commissioning

Environmental Mitigation Measures
General Construction and Operation Activities
<u>Procurement</u> Environmental issues will be considered during the procurement of goods and equipment Responsible use of materials (eg recycling and re-use) to minimise waste
<u>Habitat Loss</u> Sites & routes have been selected to avoid protected areas and ecologically sensitive areas wherever practical Pre-clearance surveys will be undertaken to identify, transplant or otherwise manage rare and endangered botanical species that are likely to be affected by the construction operations There will be clear demarcation of workspace boundaries through sensitive areas Construction traffic will be restricted to approved access roads and the ROW Ecologically sensitive areas will be reinstated as soon as practical after construction
<u>Introduction of competitive species</u> Information on this issue will be provided in workforce and visitor induction training Invasive species assessments will be included in the project construction environmental monitoring programme
<u>Hazardous materials management</u> There will be no storage of hazardous materials in active floodplains or within 30m of a watercourse Storage in areas of known groundwater vulnerability will be minimized Hazardous materials will only be stored within designated storage areas and using appropriate procedures (eg, bunding, impermeable surfaces, secure drainage, limited access, labelling) A record will be kept of all hazardous materials on-site and Material Safety Data Sheets (MSDS) maintained Potentially reactive materials will be segregated Personnel will be trained in safe use & handling of hazardous materials Spill response equipment (absorbents etc) will be available and emergency response training provided
<u>Solid waste management</u> A strict duty of care will be enforced on the project managers and the contractors Secure waste storage sites will be established, in defined areas away from watercourses and drains, and secure from vermin There will be a prohibition on uncontrolled burning or burial of waste There is a requirements for the environmental review of potential landfill & incinerator sites including site selection & proposed mode of operation Monitoring and auditing of waste management practices will be carried out during construction and operation

Environmental Mitigation Measures

Liquid waste management

Water quality will be monitored prior to discharge

There will be a prohibition on the discharge of contaminated wastewater to the environment

Sewage treatment facilities have been incorporated into the design of construction camps

Wherever practical there will be no disposal of liquid wastes in vulnerable groundwater areas

There will be brief environmental assessment of disposal options and locations

A routine wastewater monitoring programme will be developed and implemented

Traffic management

Project speed limits will be strictly enforced

Driver will receive safety and environmental awareness training, and be subject to assessments and monitoring

Construction traffic will be restricted to approved access roads and the ROW

Vehicles will be maintained to minimise emissions and fuel consumption

Warning signs will be placed at road crossings and other appropriate locations as required

Temporary traffic control will be established where necessary at road crossings and junctions

A local community safety awareness programme will be implemented and communities will be discouraged from use of the ROW as a road

Soil structure

Soil storage areas will be protected from vehicle movements

The subsoil beneath the vehicle running track will be broken up prior to reinstatement

Appropriate use of load bearing materials (eg, mats, straw, geotextile membrane) in areas of particularly soft ground

Topsoil and subsoil will be stored separately to maintain seed bank viability and soil structure

Dust generation

Wetting of the ROW will be carried out to reduce dust generation

Areas of particularly sensitive crops or animals eg cotton and bees, will be identified and consultations held with the owners

Air Emissions

Equipment and vehicles will be maintained in line with manufacturer's recommendations to meet relevant international standards

Vehicle emissions will be monitored periodically

A monitoring and maintenance programme will be developed to ensure emissions from plant meet required standards

Environmental Mitigation Measures
<p><u>Noise Emissions</u></p> <p>Equipment and vehicles will be maintained in line with manufacturer's recommendations to meet relevant standards</p> <p>Noise abatement equipment will be used where appropriate</p> <p>Most work will be limited to defined, daylight, working hours</p> <p>Vehicles will be used responsibly, eg machines will not be left idling for long periods if they are not in use</p> <p>Local residents will receive prior notification of particularly noisy activities</p> <p>Noise emissions will be monitored against noise control targets</p> <p>A monitoring and maintenance programme will be developed to ensure emissions from plant meet required standards</p>
<p><u>Irrigation canals</u></p> <p>Where possible flow will be maintained in active drainage or irrigation systems during construction work through use of measures such as pumping, channel diversions and fluming</p> <p>Any disrupted drainage or irrigation systems will be reinstated to a standard at least equal to the original conditions upon completion of construction work</p>
<p><u>Archaeological management</u></p> <p>The pipeline has been routed to avoid known or potential archaeological sites where practical</p> <p>A Cultural Heritage Management Plan has been developed and is being implemented. This addresses pre-construction and construction phase activities</p> <p>Pre-construction work will be undertaken to evaluate & record suspected archaeological sites</p> <p>There will be specialist archaeological surveillance present during the clearance of the ROW and facility sites</p> <p>Issues of archaeological awareness (such as ownership of finds, notification of finds and protection of archaeological sites) will be included in induction training</p>
<p><u>Sediment control</u></p> <p>Sediment fencing, drainage channels & trench barriers will be installed where appropriate</p> <p>Water will be discharged through a filtering medium as necessary</p>
<p><u>Contamination</u></p> <p>Contamination will be avoided construction in areas of known or suspected contamination as far as is practical (N.B. the pipeline has been routed to avoid many areas of known or potential contamination and a baseline contamination survey has been carried out.)</p> <p>Known contamination within the construction corridor will be cleared prior to construction to at least a standard that ensures worker health and safety</p> <p>Contaminated soil will be segregated from uncontaminated materials</p> <p>Containment measures (ditches, impermeable base membranes, covers) will be provided to minimise run-off from any contaminated soil piles</p> <p>Where offsite disposal or long-term storage of contaminated material is required it will be undertaken in accordance with the provisions set out in the project Waste Management Plan</p>
Construction Camps and Storage Yards

Environmental Mitigation Measures
<p><u>Abstraction of Groundwater</u></p> <p>Vulnerable water bodies, wetlands & groundwater sources have been identified and recorded</p> <p>Sampling and analysis of water from existing boreholes will be carried out to determine existing contamination levels</p> <p>All new abstractions for use by the project will be subject to environmental review</p> <p>The project will adhere to national and local licensing policy for abstractions</p> <p>Test-pumping of new abstractions will be subject to test pumping and of impacts on the flow rates of existing abstractions will be monitored</p>
<p><u>Construction of Crossings</u></p>
<p><u>Roads</u></p> <p>Trenchless crossing techniques will be utilised for many major roads</p> <p>Minimise duration of closure of roads and provide temporary access where necessary</p> <p>Steel plates will be lain across the trench to maintain access where practical</p> <p>Communities will be consulted prior to any temporary closure of roads</p>
<p><u>Rivers</u></p> <p>Open cut of fish spawning rivers (eg the Kura West and the Hasansu) will be avoided between early October and late June</p> <p>Environmental considerations will play a significant role in the selection of crossing design and choice of methodology</p> <p>Where possible, existing river flows will be maintained during construction work (including the use of measures such as trenchless crossings, pumping, channel diversions and fluming)</p> <p>The duration of any necessary flow interruptions will be minimized</p>
<p><u>Horizontal directional drill</u></p> <p>Extensive geotechnical survey work has been conducted during project design</p> <p>Storage of drilling muds will only be permitted in a bunded area</p> <p>The use of toxic chemicals in drilling fluids will be avoided</p>
<p><u>Testing and Commissioning</u></p>
<p><u>Hydrotest water</u></p> <p>Use of chemical additives in hydrotest water will be minimized</p> <p>Discharge of hydrotest water will be controlled to reduce soil erosion</p> <p>Water will be tested and treated as necessary before discharge to ensure it meets agreed standards</p>

1.6.2 Management of socio-economic impacts

Socio-economic impacts that have been identified relate not only to fact - the aspects of the project - but also to individual and community perceptions and attitudes towards these aspects, gleaned through the ESIA consultation process. The addition of perception and community attitudes towards the issues means that the impact will vary according to the individuals or communities involved. As a result, assessment of the likely magnitude of an impact involves a degree of subjective, albeit professional judgement.

Construction

Four categories of socio-economic issue related to project construction activities have been identified. These are as follows:

- Local employment and procurement opportunities
- Land acquisition and land-based livelihoods
- Local infrastructure, services and natural resources
- Community relations, management of construction workers and camps

The table below summarises the mitigation measures developed to address each of these issues.

SOCIO-ECONOMIC MITIGATION MEASURES
<p><u>Employment and local sourcing opportunities</u></p> <p>The SCP partners and the contractor will agree a plan for local labour content</p> <p>Preference will be given to suitably qualified and experienced applicants from communities local to the pipeline route</p> <p>Recruitment procedures will be developed that will be transparent and fair</p> <p>The contractor will develop and implement training programme for local workers</p> <p>The contractor will develop and implement a plan to maximize local sourcing opportunities</p>
<p><u>Land and Land Based Livelihoods</u></p> <p>A fair and transparent compensation process has been developed for land owners and land users</p> <p>Prior consultation on land acquisition, entitlements and compensation has been held with land owners and users along the route</p> <p>Grievance procedures have been drawn up to aid in the resolution of disputes</p> <p>Procedures have been developed to manage crossings of irrigation canals and other infrastructure and services to minimise damage and disturbance.</p> <p>Land owners and users will be allowed continued access (with minor restrictions) to the pipeline corridor after construction</p>
<p><u>Infrastructure and Resources</u></p> <p>There will be upgrade of some existing roads and construction of some new access roads</p> <p>Roads used by the project will be maintained during construction and any damage to roads caused by the project will be rectified</p> <p>All roads will be restored to a condition at least as good as that existing before the project</p> <p>The quality of roads prior to and after project will be documented</p> <p>Development of and adherence to Transport Management Plan, including focus upon community safety</p> <p>All other infrastructure eg irrigation canals and fences, to be documented prior to construction and restored to at least their pre-existing condition after construction</p>
<p><u>Construction Workers and Community Relations</u></p> <p>Development and implementation of Community Liaison Management Plan and Construction Camp Management Plan</p> <p>Establishment of community Liaison team to facilitate relationships with communities during the construction phase</p> <p>Development of a code of conduct for camp workers, camp rules and disciplinary procedures</p> <p>All workers will receive cultural sensitivity and health awareness training</p>

Pipeline Operation

There are few significant socio-economic impacts associated with the operation of the SCP pipeline. These can be identified as follows:

- Direct employment of approximately 100 operational staff
- Skills enhancement from long term employment opportunities
- Minor restrictions on the use of land on the ROW (eg no deep rooting plants directly above the pipeline, no new buildings, no deep ploughing or use of explosives)

Mitigation measures for negative impacts during the operational phase are consistent with those drawn up for the construction phase.

An additional major issue identified during ESIA consultation was community expectations of improved access to energy as a result of the project. Given this is not a direct impact of the project, but an outstanding community concern, it has been dealt with under Residual Impacts below.

1.7 RESIDUAL IMPACTS

1.7.1 Environmental residual impacts

There will be a number of positive residual environmental impacts associated with the SCP project. These include:

- Development and implementation of environmental investment programmes focused on maintenance of biodiversity along the pipeline corridor
- Benefits of an increased knowledge base of the Azerbaijan environment as a function of the SCP project baseline studies – the data collected will be shared with the academic community and made public
- Benefits resulting from the contaminated land survey and clean up of identified areas of 3rd party, pre-existing contamination
- Skills transfer between international and national environmental consultancies and scientists eg in survey techniques and national ecological knowledge
- Investigations before and during construction will result in an increased knowledge of archaeological features along the route, thereby increasing the national archaeological record
- Raising public awareness of environmental issues in Azerbaijan, on an international, national and community level, through the publication of documents and consultation

Air Quality and Climate

Given the extent of spatial and temporal distribution of emissions to atmosphere no significant residual impacts will be associated with construction activities. However it is recognised that

there is likely to be generation and deposition of significant quantities of dust in the immediate vicinity of the construction works.

Noise

Noise associated with pipeline construction will be short term at any one stationary receptor but cannot be fully mitigated. Therefore residual noise impacts during construction are recognised.

Soils

Proposals for handling and storage of soils, and for soils re-instatement, will minimise erosion and therefore no significant residual impacts are expected.

With regard to soil quality the mitigation measures will minimise, but not eliminate, the potential for the reduction of diversity and viability of the seedbank. The significance of this impact is however low considering the small incidence of the disturbed land compared with the overall occurrence of the subject soils.

Ecology

The SCP pipeline route will cross several ecologically sensitive areas resulting in a number of residual impacts.

The main impacts will be associated with the disturbance to the sensitive Gobustan desert area, where it is estimated that it will take approximately 10 to 12 years for complete habitat recovery on the construction corridor following reinstatement.

Landscape

The visual impact of pipeline construction operations will be short term for most stationary receptors. Longer term impacts will be minimised by the implementation of appropriate reinstatement measures along the ROW. There is likely to be a residual visual impact from:

- The upgrade of an existing access road in the Gobustan desert area
- Construction of the pipeline along narrow ridges in the Gobustan (Mud Volcano Ridge), Tovuz and Hasansu areas

1.7.2 Socio-economic residual impacts

There are a number of positive residual socio-economic impacts associated with the SCP project in Azerbaijan, related to both the construction and operation of the pipeline. These include:

- Additional cash injected into communities
- Wide distribution of economic benefits
- Enhanced local experience and employability
- Economic benefit of indirect employment opportunities:

- Enhanced capacity to tender for contracts
- New roads / improvements to roads
- Improved health awareness
- Access to new cultures and international attitudes

The main residual negative social impacts associated with the construction and operation of the SCP pipeline in Azerbaijan are addressed below.

Access to energy

During preliminary consultation, many communities with poor energy supply clearly associated the construction of pipelines with potential provision of energy to their houses, primarily during pipeline operation. Whilst the project will not draw energy from community sources either during construction or operation, nor will it provide them directly with any additional energy.

Employment expectations

There was clear evidence that communities have the expectation that the number of jobs that will be created, and the duration of the employment, are larger and longer than they will actually be. It is therefore important to provide accurate information on this topic in order to avoid potential disappointment.

The employment strategy developed should ensure that local employment levels are maximised as far as practical and community consultation has sought to clearly outline the level of employment that is expected during both construction and operation of the pipeline.

Accidents involving community members

Accidents involving community members, while potentially serious on an individual basis, are expected to be rare given the strong emphasis placed by the SCP partners on health and safety issues. Although all practical steps will be taken to ensure that no accidents occur any incident that harms a person will have a high significance residual impact in terms of diminishing quality of life for that person, negatively impacting them or their household livelihood, and potentially creating tension between the local community and the project team.

Local infrastructure, services and natural resources

Damage to roads from construction traffic and the depletion of community access to power are key concerns for local communities.

The project will build some new roads and improve some existing roads which will have a beneficial impact for local communities. Mitigation should also ensure that roads remain in a safe and reasonable condition, although residual community resentment may be generated if the high standards that follow the initial upgrades are not maintained.

On the basis of the current design the power draw from local sources for the project in both construction and operational phases should be minimal.

Managing community relations

Despite the positive attitude towards the pipeline found during consultation, it is possible that tensions between communities and the pipeline project will arise during construction, for example in relation to nuisance and disturbance, or in regard to opportunities for employment.

Therefore the approach to management of community relations is one of the most crucial mitigation measures.

Impacts on communities will be considerably reduced in the operation phase of the pipeline, however an on-going community relations programme will ensure that community concerns continue to be understood and addressed as appropriate.

1.8 CUMULATIVE IMPACTS

The cumulative effects of the project are considered at three geographical levels: regional, national and route level. At a regional level the effects of SCP have been evaluated in combination with the other oil and gas development in the regions, including the upstream activities that will generate the crude oil to fill the SCP pipeline, and other oil and gas developments in the Caspian region. In this context, the contribution of SCP in Azerbaijan, to the overall environmental impacts associated with these activities is negligible.

At a national level, the project has been assessed in conjunction with other activities that could benefit from the development of the crude oil pipeline or that could have a negative interaction with the project.

At the route level the project's main interaction is clearly with the BTC oil pipeline with which SCP shares a common corridor. The main route level cumulative impacts are outlined below.

Longer duration of the construction project

The construction of two large diameter pipelines along the same corridor will have a longer duration than construction of a single pipeline. Therefore there will be additional disturbance to the local populations eg through dust and noise generation, and additional vehicular traffic along access routes.

Land take and subsequent habitat loss

The combined construction corridor required for the two pipelines is 44m wide. Were the two pipelines to be built in separate corridors the overall width of land disturbed would be much greater (approximately 64m) in addition to having opened a secondary pipeline corridor through the country. There is a significant positive cumulative impact of the two pipelines sharing a common corridor.

Delayed reinstatement of the ROW

The co-existence of the two projects in the same corridor may lead to a delay in the start of full reinstatement of some sections of the ROW. This could have the following negative impacts:

- The landscape value of certain sections of the ROW will be reduced for an extended period of time
- Prolonged topsoil storage may lead to impoverishment of the seed bank and a reduction in the germination rate of the surviving seeds
- The delayed permanent restoration of the ROW could facilitate the onset of erosive processes with associated negative impacts to the soils

The reinstatement plan has been developed to address these issues and states that interim measures will be adopted in areas where full reinstatement is delayed, with the primary objective of preventing erosion.

Green house gas emissions associated with project activities have also been estimated and assessed, and regarded as of relatively minor significance when considered within a national, regional and global context.

Economic Benefits and Livelihoods

The cumulative socio-economic impacts resulting from the SCP, BTC and any other industrial development projects will, if well managed, provide an overall increase in wealth and livelihoods for the national population. The main national level benefit is increased government revenues from transit of oil and gas and from taxes. Increased government revenues could contribute to an increased standard of living for the national population.

The combined effect of the two pipeline projects will be to double the inflow of cash into the local economies along the pipeline corridor, through doubling:

- Length of and number of opportunities for employment for unskilled and semi-skilled labour
- Opportunities for the provision of goods and services
- The knock-on effect of having salaried workers living in the local villages.

Skills Base

Both SCP and BTC projects will develop and implement training programmes. The cumulative impact of SCP and BTC will be to double the scale and impact of the training. As a result of the BTC training programme, the SCP project may be able to achieve a higher proportion of local employment than BTC. The combined impact of the projects will be to increase the pool of labour in Azerbaijan with experience in major international construction projects.

Disruption of Land Use

Cumulative impacts of SCP and BTC pipeline in terms of land are complicated. On the one hand, the effect of planning the two projects in parallel will result in reduced impacts had the alternative been to run the two pipelines independently of one another. On the other hand, the

effect of constructing SCP after BTC pipeline will result in some of the land being out of production for at least one, if not two or three seasons longer than would have otherwise have been the case. This will result in longer-term impacts for individuals affected by the temporary land take. However the land compensation process should effectively mitigate this impact.

1.9 ENVIRONMENT AND COMMUNITY INVESTMENT PROGRAMMES

In addition to the above direct mitigation and management measures, an Environmental Investment Programme (EIP) and a Community Investment Programme (CIP) are being developed in order to go beyond direct mitigation and to help meet environmental and community needs and offset remaining residual impacts.

1.9.1 Environment Investment Programme (EIP)

Objectives of Environmental Investment Programme

In recognition of the importance of the regions biodiversity, the aim of the EIP is to enhance biodiversity management and/or protection primarily through investments in offset projects.

Types of Environmental Investment

Although still in the development stage, it is likely that the EIP will focus on the following themes:

- Protected areas and species
- Areas of high ecological significance outside protected areas
- Capacity building for biodiversity management

Timeframe

The development of the EIP is being undertaken through consultation with stakeholders to gain an understanding of where involvement would be most beneficial. The intention is that potential programmes or projects are developed and implemented in conjunction with relevant stakeholder bodies. Identification of potential partners is underway.

Implementation of the EIP will follow BP's business processes and control procedures for managing project performance and cost.

The programme will be publicised in more detail later in 2002, once feedback on the ESIA has been received and further consultation with authorities, NGOs and affected communities has taken place. It is expected that actual investments will begin in late 2002 or early 2003.

1.9.2 Community Investment Programme (CIP)

The objective of the CIP is to have a positive impact on communities most affected by construction activities by providing direct benefits, and by engaging with and adding value, to local communities in a sustainable way. The CIP will go beyond the social impact mitigation measures described in the ESIA and move towards BP's goal of having a positive influence in the areas in which BP operates.

There will be two types of community investment projects:

Sustainable Development Projects, which will be larger scale and longer term in duration, and will take place primarily in communities that are directly affected by pipeline activities but may be extended to nearby towns or villages

Local Community Projects, which are relatively small in scale and duration but respond to an immediate need in those communities that are directly affected by the construction activities

Potential projects will be developed through discussions with the communities themselves, NGOs, international development agencies and government. These discussions will ensure that the SCP project is not duplicating effort, and gains from the experience of NGOs and other potential implementation partners. Potential projects will be selected on the basis of criteria drawn from international community investment best practice and local experience.

1.10 MANAGEMENT AND MONITORING

BP's approach to Environmental and Social Management is to apply the key principles of environmental and social protection to all activities for which it is the Operator.

These principles include:

- Prior assessment of environmental and social impact
- Minimisation of potential impact through design and other mitigation controls
- Monitoring of effectiveness of controls
- Auditing of performance

The principal tool that will be employed to coordinate and review the environmental and social performance of the project will be the SCP Environmental Management System (EMS). Social issues will also be addressed within the EMS.

For the construction phase, the EMS will provide an umbrella for the implementation of requirements specified in a series of management plans addressing specific issues. Adherence to these plans will be assessed through a regular programme of monitoring and auditing, and the EMS will be subject to regular review and amendment as necessary.

A project specific operational phase EMS will be developed, in line with the requirements of ISO14001. The EMS will be certified to the ISO standard within 9 months of becoming operational.

1.11 OVERALL PROJECT ASSESSMENT

The ESIA process has identified those SCP project activities that could result in impacts to existing environmental and social conditions, and has provided an evaluation as to the significance of those impacts. Mitigation plans have been developed for each of the impacts to accentuate any positive benefits and to minimise or remove any negative impacts. The most valuable tool in this process has been analysis of the extensive environmental and social surveys and consultations undertaken over the last two years.

1.11.1 Environmental project assessment

The assessment shows that the majority of the impacts will be associated with the construction phase. Potential construction impacts will be mitigated through the implementation of good construction practice, adherence to management plans, and through the application of localised measures to protect specific or sensitive receptors.

The operation of the pipeline will result in minimal localised impacts..

The potential for unplanned events and the potential consequence of such events on the habitats, rivers and groundwater resources crossed by the pipeline have also been analyzed. The assessment shows that the likelihood of any event occurring and the risk of significant impacts resulting, are very low. In the unlikely event an incident were to occur the impact could be significant dependant upon the scale of the event, geographical location of the event site, and the local metrological, geographical and hydrological conditions.

The mitigation measures implemented through construction and operations will be monitored and reviewed on a regular basis to ensure they are effective. Alternative measures will be applied if necessary. To ensure that the mitigation measures are implemented in the field requirements have been included within the construction invitation to tender documents. Assessment of contractors approach to mitigation will form a significant component of the bid review process.

1.11.2 Socio-economic project assessment

Consultation revealed that most communities are generally positive towards the SCP project. Their perception is that any disruption will be temporary and offset by potential economic benefits both to their community and to Azerbaijan.

There will be a number of socio-economic benefits associated with the SCP project. These include:

- Development of a CIP focused on communities adjacent to the pipeline corridor and associated facilities
- Direct employment – there will be a limited number of opportunities for direct employment on the project, primarily short term jobs during construction, with fewer, longer term, vacancies during operation
- Opportunity for provision of goods and services to the project

- Skills development and training, increasing the employment chances of people after the pipeline construction period
- Enterprise development, a transfer of business knowledge and skills eg internationally recognized standards of HSE, technical, commercial, accountancy, IT etc
- Infrastructure improvement – including temporary and permanent upgrade of some roads
- Benefit of the increased knowledge basis of the Azerbaijan social and economic conditions along the pipeline route, through the SCP project baseline studies – the data collected will be shared with the academic, aid agency and NGO communities
- Skills transfer between international and national consultancies, eg in social data gathering and survey techniques
- Increased public awareness of socio-economic issues in Azerbaijan, on an international, national and community level, through publication of documents and consultation
- Utilisation in-country of international best practice in relation to land acquisition and compensation

Two of these positive aspects were particularly prominent during consultation, firstly in relation to possible employment opportunities, and secondly in relation to possible expenditure on local goods and services by construction workers.

There was clear evidence, however, of the communities having some expectations which will not be realized as a direct result of the project. It is therefore important to provide accurate information on these topics in order to avoid potential disappointment.

- Firstly, the level of anticipated employment is higher in terms both of numbers of jobs to be created and length of employment
- Secondly, villagers living in communities with poor energy supply clearly associated the construction of energy pipelines with immediate provision of energy to their houses, which is not possible from high pressure export pipelines

After more than a year of regular consultation these expectations have since been reduced, but will still require careful management in the future.

To conclude, although there are a few residual concerns relating to the construction of the pipeline which need to be carefully managed through the mitigation measures set out in the ESIA document, it is generally anticipated that both the construction and operation of the SCP pipeline will bring short and long term benefits to the communities. These are particularly relevant in relation to employment, provision of goods and services and community investment which will provide longer term benefits to many communities thereby helping to off-set any short term negative impacts.

ESIA is an iterative process. Therefore there will be continual effort to increase and further refine knowledge of the environmental and social issues associated with the SCP pipeline throughout construction and operation.

GLOSSARY AND LATIN NAMES

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2 GLOSSARY AND LATIN NAMES

2.1 GLOSSARY OF TERMS

AAQC	Ambient Air Quality Criteria
AC	Alternating Current
ACG	Azeri, Chirag, Gunashli offshore oilfield, Caspian Sea
Acheulian	A stratigraphic stage name based on an early Palaeolithic culture, for part of the European Lower Pleistocene
AETC	The company Azerbaijan Environment and Technology Centre - RSK's sister company in Baku
AGI	Above Ground Installation
AGT	Azerbaijan Georgia Turkey pipelines project - BTC and SCP combined
AIOC	Azerbaijan International Operating Company
AIDS	The disease - Auto Immune Deficiency Syndrome
Aksakal	Elderly respected people in communities
Alluvium	Fine grained soil consisting of mud, silt and sand deposited by flowing water
Alternative pipeline route	A previously considered pipeline route that deviates from the existing proposed route
Ambient noise	Totally encompassing sound in a given situation in a given time. Usually composed of sound from many sources near and far
Anti-scour devices	Impermeable barriers built around downhill pipeline sections to prevent erosion
API	American Petroleum Institute
ASCE	Azerbaijan State Committee for Ecology and Nature Resources Utilisation. Recently incorporated into the Ministry of the Environment
ASME	American Society of Mechanical Engineers
Aspect (environmental)	A generic term describing activities or an element of the project that may interact with the natural environment (see also impact, below)
ASTM	American Society for Testing and Materials
Averaging time	The period of time over which measurements are averaged
A-weighting	A-weighting most closely matches the sensitivity of the human ear to the sound frequency spectrum
Backfill crew	The crew that replaces subsoil in the trench after the pipeline has been laid
Backhoes	Excavators
BACT	Best Available Control Technology
Barg	A Unit of Pressure
Baseline	Existing Conditions
Baseline studies	Environmental or socio-economic studies establishing the existing environmental or socio-economic conditions
BATNEEC	Best Available Technique Not Entailing Excessive Cost
BCM	Billion Cubic Metres (10 ⁹)
Berms	An engineered (earth) bank forming secondary containment around tanks or a screening mound or stockpile
BG	British Gas
Biodiversity	Range of animals and plant species present in a region
Block valve	Device for stopping flow and isolating the pipeline into distinct sections
Blowdown	Release of pressure from a vessel or effluent resulting from purging of process vessels

BOD₅	5 day Biological Oxygen Demand
Bopd	Barrels of oil per day
BOTAS	Lump sum contractors for Turkish section of the BTC pipeline
BP	International energy group currently leading work on the BTC and SCP projects
BPEO	Best Practicable Environmental Option
Breccias	Rock (concreted) consisting of angular fragments embedded in a finer matrix
Bronze Age	Technological stage between the Stone and Iron Ages, beginning in the Middle East about 4500 BC and lasting in Europe from 2000-500 BC
BS	British Standard
BSI	British standard institute
BTC	Baku-Tbilisi-Ceyhan Oil Pipeline
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
BU	Business Unit
Bunding	A form of secondary containment, eg around tanks
C2+	Hydrocarbons with more than 2 carbon atoms
C4	Hydrocarbons with 4 carbon atoms
C5+ gasoline	Hydrocarbons with more than 5 carbon atoms
Caravanserai	An inn surrounding a courtyard where caravans rest at night
CCTV	Close Circuit Television
Cenozoic	An era of geologic time, from the beginning of the Tertiary period to the present. The Cenozoic is considered to have begun about 65 million years ago
CEP	Caspian Environment Programme
CH₄	Methane
CITES	Convention on International Trade of Endangered Species as per 12-4
CLO	Community Liaison Officer
CO	Carbon monoxide
CO₂	Carbon dioxide
COD	Chemical Oxygen Demand
Consequences	A result or effect of an action or impact
CP	Cathodic Protection - anti-corrosion system based on physical principle of ion exchange
Cretaceous	The final period of the Mesozoic era (after the Jurassic and before the Tertiary period of the Cenozoic era), thought to have covered the span of time between 135 and 65 million years ago
CRM	Community Relations Manager
CRTC	Caspian Regional Thematic Centre
CTP	Crude Topping Unit
Cumulative Impact	An impact resulting from the combined effects and interactions of past, present or future projects or activities
CV	Calorific Value
dB(A)	The dB(A) is the unit used to measure the A-weighted decibel scale, which compensates for the specific sensitivities of the human ear (compared to a normal, unselective microphone)
DBA	The sound pressure level of a signal which has been passed though an "A" filter whereby both low and high frequency components are attenuated
Decibel (dB)	Units used to measure the intensity of sound. It can be specifically defined as the logarithmic ratio of a sound pressure relative to a reference level of 20 micro-Newtons per square metre
Directional drilling	A drilling technique used to create a hole and insert the pipeline beneath obstructions (road, river, railway, canal, tree

	belt, etc)
DIV	Dutch Intervention Values
DLN	Dry Low NOx Emissions
DPI	Dye Penetrant Inspection
Duration	The length of time that something lasts or continues
DWG	Deep Water Gunashli
Dwt	Deadweight ton
E&P	Exploration and Production
EAQG	European Air Quality Guidelines
EAP	Environmental Action Plan
EA-UK	Environment Agency - United Kingdom
EBRD	The European Bank of Reconstruction and Development
EC	European Community, now more commonly known as the European Union
ECA	Export Credit Agency
Effect	Something produced, either positive or negative, by a cause or agent
EIA	Environmental Impact Assessment - the process of collecting data, consulting with interested parties, assessing significant environmental impacts (positive and negative) and defining mitigation measures
Eminent Domain	The ability to involuntarily acquire land from private land owners
EMS	Environmental Management System
Eneolithic	
Eocene	An epoch of the early Tertiary period, after the Palaeocene and before the Oligocene; also, the corresponding worldwide series of rocks (53 to 37 million years ago)
EOP	Early Oil Project (Chirag field)
EPCM Contractor	Engineering, Procurement, Construction and Management Contractor
EQE International	
ERA	Environmental Risk Assessment
ERM	The company Environmental Resources Management Ltd
ERP	Emergency Response Plan
ES	Environmental Statement
ESD	Emergency Shutdown
ESIA	Environmental and Social Impact Assessment
EU	European Union
Extent	The range over which something extends
FBE	Fusion Bonded Epoxy pipe coating for corrosion prevention
FCI-ROW	Facilities, Construction and Installation Right of Way, commonly referred to as the ROW in this ESIA
FEED	Front End Engineering and Design
FFD	Full Field Development
Field walking	An archaeological survey technique comprising the systematic recovery of artefacts from the surface of ploughed fields
Flagging	Demarcation of site/ services of particular interest or sensitivity
Flare	Equipment for burning waste gas
Frequency	The number of times that an event occurs within a given period (single event or continuous)
FSU	Former Soviet Union
Fugitives (emissions)	Discontinuous, diffuse, usually accidental, emissions to atmosphere
FWL	Fire Water Lagoon
Gabion	A stone / earth filled open wire mesh container used to strengthen river banks, steep slopes and foundations
Gauging pig	A device which can be passed through a pipe to assess its dimensions

GCM	General Circulation Models
GCV	Gross Calorific Value
GDP	Gross Domestic Product
GHG	Greenhouse gases
GIOC	Georgian International Oil Company
GIS	Geographical Information System - a digital process of mapping data in layers related to a geo-referenced base
GLC	Ground Level Concentration
GPS	Global Positioning System
GT	Gas Turbine
GWP	Global Warming Potential
Ha	Hectare
Hazard	An exposure or vulnerability to injury
HCFC	Hydro-Chlorofluorocarbon
HCl	Hydrogen Chloride
HDD	Horizontal Directional Drilling
HF	Hydrogen Fluoride
HFC	Hydro-Fluorocarbon
HGA	Host Government Agreement
HGL	
HIV	Virus responsible for the illness AIDS
HP	High Pressure
HR	Human Resources
HSE	Health, Safety and Environment
HVAC	Heating, Ventilation and Air Conditioning
Hydrotest	The process of testing the integrity of a pipeline prior to commissioning with water under pressure for an extended period
Hydrotest fluids	Fluids used in hydrostatic testing (e.g. water, possibly with biocides, oxygen scavengers, antifreeze, corrosion inhibitors and dyes)
IDP	Internally Displaced Person
IFC	International Finance Corporation, a member of the World Bank Group
IFI	International Finance Institution
IFI guidelines	International Finance Institutions guidelines
IGA	Inter Governmental Agreement
IGE	The Institute of Gas Engineers
ILO	International Labour Organisation
Impact (environmental)	A positive or negative change to the environment that results wholly or partially from project activities
Incident	An occurrence or event
Inspection crew	The crew that radiographically or ultrasonically inspects the condition of the pipeline and welds prior to pipe wrapping
IP	The Institute of Petroleum
IPS	Intermediate Pigging Station
Iron Age	Archaeological time period following the Bronze Age
ISO	International Standards Organisation
ISO 14001	The International Standards Organisation's Standard for Environmental Management Systems
IT	Information Technology
ITT	Invitation to Tender
IUCN	International Union for the Conservation of Nature
Jurassic	
K	Energy class relating to earthquake severity
KP	Kilometre point, ie distance from the start point of the pipeline measured in kilometres
kPa	
KPIs	Key Performance Indicators

KV	Kilovolt
KW	Kilowatt
L_{Aeq} dB	A measure of “average” sound level (over a specified time period). The constant level of noise that would have provided the same acoustic energy as the actual fluctuating sound during the same period
L_{Aeq, T}	Equivalent continuous A-weighted sound pressure level (SPL). The value of the A-weighted SPL in dB of continuous steady sound that within a specified time interval ‘T’ has the same mean-square sound pressure as a sound that varies with time
Leachate test	A test to determine the potential for contaminants to dissociate from soils
Likelihood	The chance or probability of something happening
LNAPL	Light Non-Aqueous Phase Liquid
LP	Low Pressure
M³	Cubic metre
Magnitude	The relative size or extent of an event or impact
Mamsl	Metres above mean sea level (Baltic Datum)
Manats	Azeri currency
MAOP	
Mb	Millibar
mbd	Thousand barrels per day
MCR	Maximum Continuous Rating
Measurement time interval - T_m	The total time over which measurements are taken (e.g. this may consist of the sum of a number of non-contiguous, short-term measurement time intervals)
Medieval period	An archaeological time period lasting approximately 800 AD to 1,500 AD
MENR	Ministry for Ecology and Natural Resources
Mesolithic	The archaeological period between the Palaeolithic and the Neolithic (12,000-3,000 BC)
Mesozoic	An era of geological time, from the end of the Palaeozoic to the beginning of the Cenozoic, or from about 225 to 65 million years ago
MG/L	Milligram per litre
μ r hr⁻¹	Micro roentgen per hour Unit commonly used in the Soviet system for the measurement of radiation. Convert to Sieverts according to the following formula 1 μ r hr ⁻¹ = 0.01mSv hr ⁻¹
MIGA	Multilateral Investment Guarantee Agency
Miocene	An epoch of the upper Tertiary period, after the Oligocene and before the Pliocene; also, the corresponding worldwide series of rocks (23 to 5 million years ago)
Mitigation	Measures that may reduce the severity of potentially significant adverse environmental impacts
MJ	Megajoule
MLAs	Multilateral Lending Agencies
MMB/D MMbd better	Million barrels per day
MMSCF/D MMscfd	Million standard cubic feet per day
MMSCM/H	Million standard cubic meters of gas per hour
MMSCM/D	Million standard cubic meters of gas per day
MPI	Magnetic Particle Inspection
MSS	Manufacture Standardisation Society
MSSOP	Maximum steady state operating pressure
MT	Million tonnes
MW	Megawatt
Mw	Magnitude of earthquake severity
N₂O	Nitrous oxide

NACE	The National Association of Corrosion Engineers
Nappes	Large-scale horizontal displacement of rocks (either folded or undisturbed)
NDT	Non-Destructive Testing
NEAP	National Environmental Action Plan of Azerbaijan
Neogene	Geological interval of time incorporating the Miocene and Pliocene of the Tertiary period
Neolithic	The period characterised by primitive farming and the use of polished stone and flint tools and weapons
NGO	Non Governmental Organisation
NO₂	Nitrogen dioxide
NORM	Naturally Occurring Radioactive Material (e.g. radon)
NO_x	Nitrogen oxides
NREP	Northern Route Export Pipeline
NRPB	National Radiological Protection Board
NSPS	New Source Performance Standards (of the US EPA)
O₂	Oxygen
O₃	Ozone
OECD	Organisation for Economic Co-operation and Development
OIEC	Oil Industries Engineering & Construction
Oligocene	An epoch of the early Tertiary period, after the Eocene and before the Miocene; corresponding worldwide series of rocks (37 to 23 million years ago)
Open cut crossing	Standard trenching technique for crossing a water body or road
OPIC	Overseas Private Investment Corporation
Orogenic	Mountain building process
OSRP	Oil Spill Response Plan
OWS	Oily Water Separator
Oxygen scavengers	Chemicals that convert available oxygen into an unreactive form
P&ID	Process and instrumentation drawings
PAH	Poly Aromatic Hydrocarbons
Palaeocene	An epoch of the early Tertiary period, after the Cretaceous period and before the Eocene; corresponding to all rock aged 65 to 53 million years. This started right after the dinosaurs died away
Palaeogene	An interval of geologic time incorporating the Palaeocene, Eocene, and Oligocene of the earlier Tertiary
Palaeolithic	Period of the emergence of primitive man, approximately 2.5 to 3 million years ago
Pathway	Chain of reactions associated with a particular metabolic process
PCB	Polychlorinated biphenyl
PCDP	Public Consultation and Disclosure Plan
PCE	Type of Chlorinated Solvent
PCU	Programme Coordination Unit
PE	Potential Evapotranspiration
PFD	Process flow diagram
pH	Measure of acidity / alkalinity
Pig	Pipeline Integrity Gauge
Pigging	The process of cleaning or measuring internally the pipeline whereby a gauge is sent through the line to scour /measure the inside of the pipeline
P_{IN}	Inlet pressure
PIP	Priority Investments Portfolio
Pipe yard	The area used to store pipes prior to being transported to the spread
Pleistocene	An epoch of the Quaternary period, after the Pliocene of the

Pliocene	Tertiary and before the Holocene; corresponding to all rocks aged 1.6 million years ago to 10,000 years An epoch of the Tertiary period, after the Miocene and before the Pleistocene; also, the corresponding worldwide series of rocks (5 to 1.6 million years ago)
PM	Particulate Matter
PM₁₀	Particulate matter of less than 10µm aerodynamic diameter.
P_{OUT}	Outlet pressure
PPAH`	Pollution Prevention and Abatement Handbook (World Bank Publication)
ppb	Parts per billion (10 ⁹)
ppm	Parts per million (10 ⁶)
ppmv:	Parts per million by volume
pRDB	
PRS	Pressure Reduction Station
PSA	Production Sharing Agreement
QA	Quality Assurance
QRA	Quantified Risk Assessment
Quaternary	The second period of the Cenozoic era, following the Tertiary; also the corresponding system of rocks. It began 2 to 3 million years ago and extends to the present
RAP	Resettlement Action Plan (though in a meeting with Anna on Tuesday seems this is evolving to LARAP? Land Acquisition and Resettlement, etc
RDB	Red Data Book
Receptor	The receiver of an input or stimulus
Reference time interval - T_r	The specified interval over which an equivalent continuous A-weighted SPL is determined
Reinstatement crew	The crew that replaces topsoil, vegetation, fences etc. once the pipeline has been laid
Reinstatement NB One word	The process of restoring the area to its prior state after pipeline laying
Residual impact	Potential impacts remaining after mitigation measures have been adopted into a project
Residual noise	The ambient noise remaining at given position in a given situation when the specific noise source is suppressed to a degree such that it does not contribute to the ambient noise.
RH	Relative Humidity
Richter scale	A logarithmic scale for expressing the magnitude of an earthquake, ranging from 0 to 8
Rip-rap	Large stones blocks from a quarry and which are placed on a river bank to prevent erosion. The stones are sometimes embedded in concrete
Risk	The probability of harm occurring from the presence of dangerous conditions or materials
ROW	The strip of land in which the pipeline will be laid. Sometimes used (incorrectly) to refer to the working width, the area cleared for pipeline construction and subsequently reinstated, which includes the ROW
RSK	The company RSK Environment Ltd
RTU	Remote Test Unit
SCADA	Supervisory Control And Data Acquisition
Scoping	The process of identifying the key environmental and social issues associated with a project and seeking agreement with interested parties about how these are to be addressed in the EIA and SIA process
SCP	South Caucasus Pipeline (previously termed Shah Deniz Gas Pipeline)
SD	Shah Deniz

Sensitivity	The level of response to a received stimuli
SIA	Social Impact Assessment - the process of collecting data, consulting with interested parties, assessing significant social impacts and defining mitigation measures
Sm³	Standard Cubic Metre
SMMP	Social Management and Monitoring Plan
SO₂	Sulphur dioxide
SOCAR	State Oil Company of Azerbaijan Republic
Source	The point or place from which something originates
SOx	
Specific noise level - L_{aeq,Tr}	The equivalent continuous A-weighted SPL in dB at the measurement position produced by the specific noise source over a given reference time interval, in integer units
Specific noise source	The noise source under investigation for assessing the likelihood of complaints
Spent catalyst	Waste catalyst in which the active component has been fully consumed
SPL	Sound Pressure Level
Spread	All the personnel and equipment necessary to carry out all stages of construction
Spread technique	The system whereby several different sequential construction phases are in process at one time along the pipeline length
SSC	Suspended Sediment Concentration
SSL	Suspended Sediment Load
SSM	Start-ups/Shutdown/Malfunction
ST	Short Term
STD	Sexually Transmitted Disease
Steady noise	Noise that gives fluctuations over a range not more than 5 dB on a sound level meter set to frequency weighting "A" and time weighting "S"
Stone Age	
STP	Sewage treatment package
Stringing crew	The crew that brings pipe sections from the pipe yard and lays them out along the Right Of Way ready for welding
Survey crew	The crew that undertakes the initial topographical and alignment surveys of the pipeline route
Suspended solids	Solid material held in suspension by the energy of water in a stream, river or discharge
Sweet natural gas	Natural gas which has a low sulphur content
Synergetics	Social Assessment Company based in Baku
TACIS	The Tacis Programme (launched by the EC in 1991) provides grant-financed technical assistance to 13 countries of Eastern Europe and Central Asia, including Azerbaijan
TCA	Type of Chlorinated Solvent
TCE	Type of Chlorinated Solvent
TCN	Third Country National – someone from outside Azerbaijan or the nationality of a contracting company
TDS	Total Dissolved Solids
TEG	Thermo electric generators
Telecoms	Telecommunications
Tertiary	
TMP	Traffic Management Plan
TOC	Total Organic Carbon
TPAO	Turkish Petroleum Anonim Ortaglygy
TPH	Total Petroleum Hydrocarbons
TRACECA	EU-funded transport corridor project linking Europe to Asia
Transformer rectifiers	Equipment to transform high voltage AC to lower voltage DC
Trenching crew	The crew that excavates the trench for the pipeline

TV	Television
TSS	Total Suspended Solids
UAE	United Arab Emirates
UHC	Unburned Hydrocarbons
UK	United Kingdom
UN	United Nations
UNAIDS	Joint United Nations program on AIDS/HIV
UNDP	United Nations Development Programme
UNHCR	United Nations High Commission on Refugees
UNICEF	United Nations Children's Fund
UPS	Uninterrupted Power Supply
URS Dames and Moore	The company URS Dames and Moore Ltd, the UK operating company of the URS Corporation of San Francisco
USA	United States of America
US\$	United States Dollar
US EPA	United States Environmental Protection Agency
US Ex Im	United States Export Import Bank
UV	Ultra-Violet
VLCC	Very Large Crude Carriers
VOCs	Volatile organic compounds
WBG	World Bank Group
Welding crew	The crew that welds the pipeline sections together
WHO	World Health Organization
WMP	Waste Management Plan
Wobbe index	The Wobbe-index reflects the gas/air relationship and combustion characteristics that express the heat impact which a burner is exposed to during combustion
Working width	The area within which the pipeline installation takes place, including topsoil and subsoil storage
Wrapping crew	The crew that wraps the pipeline (normally at joints) with anti-corrosion tape, FBE epoxy or other surface coating prior to testing and acceptance
WREP	The existing Western Route Export Pipeline oil pipeline operated by AIOC between Baku, Azerbaijan and Supsa, Georgia
ZVI	Zone of visual influence

2.2 GLOSSARY OF AZERBAIJANI PLACE NAMES

Agdash	Town and District.
Agdjaqovak	Village.
Akhindjachay	Tributary of the Tovuschay.
Akstafa	Town and district.
Akstafachay	River.
Agsu Canal	River, canalised at crossing point. (crossed at KP 111.2)
Alabashli	Pipe yard/railway sidings.
Aly Bayramly	Village
Alikend	Village.
Alimerdanli	Village
Alpout	A village in Udjar
Alyat	Town, location of meteorological station.
Amirarckh	Oil exploration field.
Amirarh	Village.
Anatolian Plateau	Plain area.
Anver Memmedhanly	Village.
Apsheron	District and also a peninsula
Araks	River.
Aran	Village and location of refugee camp.
Arazli	River.
Arshaly	Village.
Asaqy Leky	Village.
Ashagi Mulkulu	Village
Ashagy Agasybeyli	Village.
Ashagy Garhun	Village.
Ashagy Kesamanly	Village.
Azimkend	Village.
Azizbeyov	Village
Azraildag	Archaeological site.
Baku	Capital city of Azerbaijan Republic.
Barda	Village
Bashirly	Village.
Bayramly	Village.
Big Harami range	Mountain range east of Shirvan plain.
Borsunlu	Village.
Boyuk Kesik	Village.
Bumchay	Tributary of Turianchay.
Chaparhy	Village.
Chirag, Azeri and Gunashli	Oil fields in the AIOC contract area.
Chiyny	Village.
Chokhranly	Village.
Daghkesemen	Village
Dallar-Tovuz	Hydrocarbon exploration field.
Dellyar Dashbulak	Village.
Dellercirdaxan	Village.
Dallyar Djeir	Village.
Dalimamedli	Hydrocarbon exploration field.
Deller	Village and pipe yard.
Dellercirdaxan	Village.
Deyrankechmes	Wadi (crossed at KP 9.3).
Djingir	Archaeological site.
Durandar	Range of mountains and mud volcanoes towards eastern end

	of the WREP.
Duzdak	Village.
Duz Kirikli	Village.
Dzegamchay	River.
Erevanly	Village.
Eyvazlilar	Village.
Farhraly	Village.
Fizuli	Village.
Ganja	District and city.
Ganjachay	River (crossed at KP 296).
Gancachay	River (crossed at KP 298.4)
Garaarh	Village.
Garaberk	Village.
Garadag	District.
Garagemirly	Village
Geokchay	River (crossed at KP 171.3).
Giragkasaman	Hydrocarbon exploration field.
Gashgarachay	River (crossed at KP 316.7).
Gobustan	Area to east of pipeline route, some of which is proposed for designation as a National Park.
Goran	Railway Station.
Geranboy	Town and district
Geychay	Village
Goranchay	River (crossed at KP 257.8).
Great Caucasus	Region of high earthquake density.
Gurudere	River.
Gulabend	Village.
Gurbanzade	Village.
Guvekend	Village
Hadgiqabul	Town/District.
Harami	Exploration drilling field (north of Kazi-Magomed).
Hanitlu	Village.
Hasansu	River (crossed at KP 397.8)
Hodjaly	Village.
Indjasu River	River
Jandar	Lake.
Jinli Boluslu	Village.
Jingirdag	Archaeological site.
Kadily	Village
Karabakh	Region.
Karabach canal	Canal and location of one of the key archaeological sites. (crossed at KP 245.1).
Karabach Plain	Plain from Kura River to Goran railway station near Goranboy.
Karadagly	Larger village
Karadaq	Pipe yard/sidings and archaeological site.
Karadjally	Village and exploration drilling field.
Karasu	River (crossed at KP 320.9) / Village.
Karayazi	Wetland area and Nature Reserve.
Karrar	Village.
Karrar Station	Village.
Kasum Ismailov	Village.
Kazakh	Region to the south-west of the WREP.
Kazambulak	Village
Kazi-Magomed	Town. (the old name for Hadgiqabul)
Kazyan	Village.
Kechily	Village.
Kechvely	Village
Khanlor	Village
Khatunli	Hydrocarbon exploration field.

Khatinly	Village (also Khatynly).
Kirikli	Village.
Kirah Kesemen	Village
Koch Nohur	Archaeological site.
Kolkhozkend	Village.
Korchay	River (crossed at KP 292).
Koshkarchay River	River
Kura	River (crossed at KP 223.6 & 411).
Kurudera	River (crossed at KP 422.3)
Kurekchay	River (crossed at KP 276.5).
Kurdemir	District and Town.
Kurzan	Location of hydrological station on the Kura.
Leki	Village and location of proposed pipe yard.
Lyak	Village
Mahmudlu	Village.
Miaidjik	Oil exploration field.
Mingechaur	Town and location of major water reservoir.
Mugan	Village.
Muzdurlar	Village.
Nadirkend	Village.
Nakhichevan	Region of Azerbaijan separated from the rest of the country by Armenia.
Naftalan	Town.
Narimanabad	Village.
Neymatabad	Village.
Otman Bozdog	Mud volcano, NW of Sangachal Terminal
Padar	Village and exploration drilling field.
Pirsaat	Village.
Pirsagat	Wadi (crossed at KP 42.1).
Poylu	Village and station. Location of 2nd crossing of Kura river. Possible location of construction camp.
Putu	Village, location of meteorological station.
Qarasu	Village
Ramal	Village.
Randjbar	Village.
Ranzbarilar	Village.
Sabirabad	Village.
Sadixly	Village on the Azerbaijan / Georgian border adjacent to the pipeline crossing point.
Salakhly	Village.
Salaxli	Village.
Saloglu	Village.
Sametobad	Village.
Samukh	District.
Sangachal	Town south of Baku and location of AIOC oil receiving terminal. Origin of WREP, NREP and SDGP.
Sarov	Village.
Sarysu	River (crossed at KP 316.1)
Sary Tepe	Village
Seyidlyar	Village.
Shabran	Town.
Shahliq	Village.
Shak Gaya	Tie-in point of pipeline from Sangachal with existing Baku-Akstafa products line.
Shamkir	Town/District.
Shamkirchay	River (crossed at KP 332).
Sheki	Village in the Great Caucasus.
Shemaka	Village in the Great Caucasus, subject to high seismic activity/District.

Shilyan	Lake.
Shirvan	City/ Region.
Shirvan Plain	Plain from Ranjbar to Kura River.
Sigirly	Village.
Small Caucasus Plain and Lowland	Geomorphological section between Goran railway station and border.
Small Harami	Hydrocarbon exploration field.
Solakhay	Hydrocarbon exploration field.
Soyuk Bulak	Village.
Sumgayit	City
Talish	Village.
Taza Shilyan	Village.
Terkblaga	River.
Tourgay	Oil exploration field.
Tovuz	Region.
Tovuzchay	River (crossed at KP 377.1).
Transcaucasia	Area in the Caucasus Region.
Turagay	Hydrocarbon exploration field and mud volcano.
Turianchay	River (crossed at KP 193.5).
Ujar	Town/District.
Usubvurulan	Sites of pottery – village?
Villa Petrolea	BP Emergency Response Centre.
Yaharchi Gazahlar	Village
Yaldily	Village.
Varvara	State Hunting Area.
Yeni Shiximly	Village
Yevlakh	Town and Administrative region.
Yolpak	Village.
Zardob	District/City.
Zeyem	Village and proposed pipe yard location.
Zayamchay	River (crossed at KP 357)
Zelimhan	Village.
Zurnobad	Village.

2.3 LATIN NAMES

Table 2-1 Latin Names for Flora

Latin Name for Flora	Common English Name (where appropriate)	Azeri Name	Russian Name
Lower Plants			
<i>Amblystegium serpens</i> *		İ àì ú ð	ì í ð
<i>Brachythecium mildeanum</i> *		İ àì ú ð	ì í ð
<i>Campylium chrysophyllum</i> *		İ àì ú ð	ì í ð
<i>Fissidens taxifolius</i> *		Æ ð ¼aðĩ àà ì àì ú ð	Õĩèñòĩèèñòúé ì í ð
Higher Plants			
<i>Alhagi pseudoalhagi</i>	camel prickly	Äyävöèèäü	Ääáèpüéĩèè-èà
<i>Allium rubellum</i>	onion spp.	Äüðì úçü ñĩüáí	Èòè-èðñĩáèèè
<i>Alyssum desertorum</i>	alisons spp.	Ñyüðà-òúóíáóðó	Áóðà-ìè ì òñòúííúé
<i>Artemisia fragrans</i>	mugwort spp.	ßòèðèè éíáçáí	Í í è ú í ú áóèñòäý
<i>Atriplex tatarica</i>	orache spp.	Õöð ñèðèýìè	Èäñàòððñèäý
<i>Bolboschoenus maritimus</i>	sea club-rush	Äyìèç ì úäáýðè	Èèóáíäè ùð ì ðèì íðñèèè
<i>Bromus japonicus</i>	thunberg's brome	Èäì íí òííáäèìòó	Èíñòäý ÿ ííñèèè
<i>Calamagrostis pseudophragmites</i>	small reed spp.	Èóì äññòì öðýý	Ääèèè èíäí -òðíñíèèíäúé
<i>Capparis spinosa</i>	spineless caper	Õèèäèü èýäýð	Èä ññ èíèè-èè
<i>Carpinus caucasica</i>	caucasian hornbeam	Äðäç äýèýñè	Äðä Èäèçñèèè
<i>Cichorium intybus</i>	chicory	Æüððääçò ääè	Õèèìðèè íáúèííäáíúé
<i>Clematis vitalba</i>	travellers joy /old mans beard	Äüýñì ý	Äèííäðäèèèñòúé è ì ì í ñ
<i>Crataegus spp</i>	hawthorn spp.	Èä èçáí	Äíýðúäèèä äèäü
<i>Cynanchum acutum</i>	strangewart	Øèø ñèíáíðèòì	Õèíáíðòì ìñòðúé
<i>Cynodon dactylon</i>	bermuda-grass	Ääð äääðè ÷äèúð	Ñäèíðíè ì äèü-àòúé
<i>Cyperus longus</i>	galingale	Ñäà ì ýèäèòì	Ñúú
<i>Datura stramonium</i>	thorn-apple	Äýèèäáè	Áóðì áí
<i>Elaeagnus angustifolia</i>	oleaster spp.	Äðèäðì ä èéäý	Èíð óçèíèèñòúé
<i>Elaeagnus spp</i>	oleaster spp.	èéäý	Èíðä äèäü
<i>Eleocharis palustris</i>	common spike rush	Äàòäèü ä	Äíèíðíèðä
<i>Elymus repens</i>	common couch	Ñóðý í í äüì	Ýèèì òñ ì íèçó-äý

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Latin Name for Flora	Common English Name (where appropriate)	Azeri Name	Russian Name
<i>Ephedra procera</i>	ephedra	xıřáááääéú řáđà	Óáíéíéé đíñéúé
<i>Eremopyrum orientale</i>	grass spp.	Øyđá áíçáúú	Ì đòóéáíñòí÷íúé
<i>Eremopyrum triticeum</i>	grass spp.	Áóúáääđè áíçää	Ì đòóéçđíéñòúé
<i>Euphorbia helioscopia</i>	sun spurge spp.	Ñóááóéýí á í ááóáí	Ì íéí÷áé ñíéíóääéýá
<i>Fraxinus spp</i>	ash spp.	Ýřéđø äáé	ßñšý áéáú
<i>Glycyrrhiza glabra</i>	glabrose liquorice	Óöñöç áééáí	Ñíéíáéááéääéý
<i>Halocnemum strobilaceum</i>	-	Éíúóíéáđí úø ááđáđáí	Ñáđñçáí ææíáéáíúé
<i>Hedera helix</i>	ivy	Ááè ááđñáđí æ úúú	Ì épù íáúéííááíúé
<i>Hippophae rhamnoides</i>	sea buckthorn	xæòééáú	Íáéá éóáéđóæííáý
<i>Hordeum leporinum</i>	wall barley spp.	Áíáááí à đí à	ß÷í áú çý÷-éé
<i>Iris acutiloba</i>	iris spp.	Éòééýíáéú ñöñýí	Éđéñ éáñáéé ñòđíáíéúíúé
<i>Juncus articulatus</i>	jointed rush	Æúá	Ñéóíéé áéáéñóíííáíéé
<i>Kalidium caspicum</i>	-	Óçýđ ñáđúááú	Ì íòáééé éáñí ééñééé
<i>Karthamus glaucus</i>	-	Éáéá÷ú çýóýđáí	Cáóéí ñéçúé đ
<i>Lepidium perfoliatum</i>	perfoliate pepperwort	Í x éó áíçæää	Ééíí íáíéé í đííçáííééñòúé
<i>Ligustrum vulgare</i>	common privet	Ááé éáí íí áéđýřó	Áéđp-éíá íáúéííááíáý
<i>Limonium meyerii</i>	sea lavender spp.	Ì áéđ áýáýéáúú	Éáđí æ í áéđá
<i>Limonium spicatum</i>	sea lavender spp.	Áýáýéáúú	Éáđí æ
<i>Lolium rigidum</i>	rye grass spp.	Á ç é đđá èò	Ì éääæ æñóééé
<i>Lythrum salicaria</i>	purple loosestrife	Ááéáđíò	Ááááíéé éáíééñòúé
<i>Medicago minima</i>	bur-medick	Ááéáááđáííá	Épöđíá í áééý
<i>Mentha spp</i>	mint spp.	Ñó Éáđí úçú	Ì ýòú áéáú
<i>Merendera trigyna</i>	-	Ó÷óóíáéó ááääđá	Ì ááááááòđđñòíéáééíáý
<i>Morus nigra</i>	common or black mulberry tree	Ááòáóó	Øæéíáéóá÷á đíáý
<i>Myriophyllum spp</i>	water-milfoil spp.	Ñá-ááíóó	Óđóóú í óóíá÷áý
<i>Nasturtium spp</i>	water cress spp.	Ááđí áúáđí	Æđóó áéáđñóááíáý
<i>Noaea mucronata</i>	-	Í íáá đíđáíú	Ñíéýíéá ííáá ñòđíéííá-íáý
<i>Orchis caucasica</i>	caucasian orchid	Áááéáç Nyúéýá é	ßòđúđéé éääéçñ ééé
<i>Phragmites australis</i>	common reed	Ááí úø	Óđíñóíéé éíáúé ááñòđáééñééé
<i>Plantago praecox</i>	plantain spp.	Ááúáéáđí áúú	Ì íáíđíáééé éáíóáíáéáíúé

Latin Name for Flora	Common English Name (where appropriate)	Azeri Name	Russian Name
<i>Poa bulbosa</i>	bulbous meadow-grass	Niüääëü äüðòúæ	Й yöëëé éóéíäë÷íúé
<i>Polygonum hydropiper</i>	water-pepper	Nó äüðóáóúóí ó	Áíðäö í ääíúé
<i>Populus canescens</i>	grey poplar	Áä éäðí ää íäää	Óíí íëü áäëíëñòëä
<i>Populus nigra</i>	black poplar	Íäää	Óíí íëü ÷äðíúé
<i>Populus spp</i>	poplar spp.	Íäää	Óíí íëü äëäü
<i>Potamogeton spp</i>	pondweed spp.	Nó÷è÷èýéè	Ðääñò äóð÷ääúé
<i>Pulicaria uliginosa</i>	fleabane spp.	Áòääëüä í óéëèäðééñü	Äëíäéòä áíëíòíäý
<i>Punica granatum</i>	pomegranite	Áäè íäð	Äðáíàò íáúéííäáíúé
<i>Quercus longipes</i>	vardim oak	Óçóíñä éääëü í äëüä	Áóá äëéííííäéíäúé
<i>Quercus pedunculiflora</i>	oak spp.	Í äëüä	Áóá
<i>Quercus robur</i>	pedunculate oak	Í äëüä	Áóá ÷äð÷äòúé
<i>Ranunculus spp</i>	buttercup spp.	Áäè ää÷è÷ýè	Ëðéëäâëäü
<i>Rosa spp</i>	rose spp.	Áúçüè ýöè	Ðíçàâëäü
<i>Rubus sanguineus</i>	bramble spp.	Ááæðýèè áðéòðòéýí	Äääéëäéðíäääý
<i>Rubus spp</i>	bramble spp.	Áðéòðòéýí í äë ðè	Äääéëè äëäü
<i>Salicornia europaea</i>	common glasswort	Áäðíí ääóçéää ÷íüáíü	Níëäðíñ ääðíí äññééé
<i>Salix australis</i>	willow spp.	Äýíóá ñðéöäö	Ëää ðäý
<i>Salix spp</i>	willow spp.	Ñðéöä í äë ðè	Ëäü äëäü
<i>Salsola crassa</i>	saltwort spp.	ßòèè äíðáí	Níëýíëä í ýñèñòäý
<i>Salsola dendroides</i>	saltwort spp.	Áüäääðè äíðá í	Níëýíëä äðääíäëáíäý
<i>Salsola ericoides</i>	saltwort spp.	Ëðäðýè éíäääí	Níëýíëä ääðèñíäëáíäý
<i>Salsola nodulosa</i>	saltwort spp.	Ýýíýç	Níëýíëä äíðíäý
<i>Salsola paulsenii</i>	saltwort spp.	Í äóèñä äíðáíü	Níëýíëä ñèçäý
<i>Sambucus nigra</i>	elder	Áäðäéýíäýèä ø	Áóçéíä ÷äðíäý
<i>Silybum marianum</i>	milk thistle	Áäää	Ðañóíðíí ää
<i>Smilax excelsa</i>	greenbriar spp.	Üóíäöð í ýðää÷ý	Ní éëäñ äüñíéëé
<i>Stipa szowitsiana</i>	needle grass spp.	Øíäèñ äééääü	Ëíäüëü Øíäéòä

Latin Name for Flora	Common English Name (where appropriate)	Azeri Name	Russian Name
<i>Suaeda altissima</i>	sea blight spp.	Aðëù ÷yðýí	Náàà áûñîëäý
<i>Suaeda confusa</i>	sea blight spp.	İ ööyëëð ÷yðýí	Náàà çäí óóáíáý
<i>Suaeda dendroides</i>	sea blight spp.	xýðýí êîë	Náàà êóñòäîë÷êíáäý
<i>Suaeda microphylla</i>	sea blight spp.	xýðýí õùðáá/äî ää	Náàà í äêéíëñòàý
<i>Suaeda australis</i>	sea blight spp.	xýðýí	Náàà
<i>Tamarix ramosissima</i>	tamarisk spp.	xíðáóáääëù éóëüóí	Óà äðëñê í ääëü÷àòúé
<i>Torularia contortuplicata</i>	-	Áóðóääéó ì ñî ñè	Óíðóéäëý
<i>Typha latifolia</i>	bulrush	Áíëëëäî ää ÷ééýí	Ðíáíç æðíêíëëñòíúé
<i>Typha spp</i>	bulrush spp.	Áäð/äî ää ÷ ééýí	Ðíáíçà áéäú
<i>Ulmus carpiniifolia</i>	smooth elm	Áäüáæ	Áýç äéäêíëëñòúé
<i>Ulmus foliacea</i>	smooth-leaved elm	Áäüáæ	Áýç êëñòíáäòúé
<i>Vitis sylvestris</i>	woodland grape	İ äý öçòí ö	Áéíáðää êáííé
<i>Xanthium spinosum</i>	cocklebur spp.	Óëëäëù ì ùððää	Áóðíëäéé êíëð÷éé
<i>Zerna rubens</i>	brome spp.	Áúçäá òííáæíðó	Êíñòä êðáí ðúéé

Note: * These lower plants have no Azeri and Russian names.

Table 2-2 Latin Names for Fauna

Latin name for Fauna	Common English name (where appropriate)	Azeri Name	Russian Name
Invertebrates			
<i>Anchylocheria salomoni</i>	beetle spp.	Niëii ííáúçúéápæëè	Niëii ííá à çèàèà
<i>Anthophora nigriceps</i>	bee spp.	Aðú	Í ÷ æ à
<i>Astacus pyzolwi</i>	crayfish	xæ öyð÷yíyè	Ðæ ðáí íé
<i>Bombus argillaceus</i>	bumble -bee spp.	Çiëääëú aðú	Øi æ ü
<i>Bombus daghestanicus</i>	daghestan bumble bee	Áäüñòá çíëääëú aðúñú	Øi æü äääñòáñéèé
<i>Bombus lagsus</i>	bumble bee spp.	Çiëääëú aðú	Øi æ ü
<i>Bombus muscorum</i>	bumble bee spp.	Çiëääëú aðú	Øi æ ü
<i>Bombus persicus</i>	bumble-bee spp.	Óaðñ çíëääëú aðúñú	Øi æü í aðñèääñéèé
<i>Coenonympha saad</i>	heath spp. of butterfly	Í yõì yðè èyì yíyè	Aððòàíèöà
<i>Colias aurorina</i>	clouded yellow spp.	Aáðíðèíàñáðúæñú	Aæòóæà
<i>Daphnis nerii</i>	oleander hawkmoth	Íæáíáð úàóú	Aðæéè íèääíáúé
<i>Iphiclides podalirius</i>	scarce swallowtail	Í íäæèðè	Í íäæèðèé
<i>Manduca atropos</i>	death's-head hawkmoth	Éyèy öyèèèèè úàð	Aðæéè í aðòáý áíéíàà
<i>Megacephalus euphraticus</i>	beetle spp.	Öyðàð ÷áí áúáú	Aáððàðñéèé ñéæóí
<i>Melitturga clavicornis</i>	bee spp.	Í æèòóðá aðúñú	Í æèòóðáà
<i>Papillo machaon</i>	swallowtail	Í àóáíí	Í àóáíí
<i>Tomares romanovi</i>	hairstreak spp.	Ðíí áííáòìí aðñè	xðáííð Ðíí áííàà
<i>Xylocopa valga</i>	bee spp.	Äöëyðð aðú	Í ÷ æ à-í èíóíèé
Fish			
<i>Abramis brama orientalis</i>	caspian bream	xä ää	Éäü áíñòí÷íúé
<i>Abramis sapa bergi</i>	white-eyed bream	Í íðó	Äæíäèçèà þáíèáñí èéñèäý
<i>Acanthalburnus microlepis</i>	blackbrow	Äðääæ	xðííáðíáèà
<i>Acipenser nudiventris</i>	sturgeon spp.	Éyèyì í	Íñáðð áèäü
<i>Barbus brachycephalus</i>	barbel spp.	Öyçyð æðáéòè	Éñí èéñèèè óñà-
<i>Barbus capito</i>	chanari barbel	Çyðäyí yð	Óñà- äáðè
<i>Barbus mursa</i>	murtsa barbel	Í óðñà	Óñà- í óððà
<i>Caspiomyzon wagneri</i>	caspian lamprey	Öyçyð èèááæúúú	Í èííáàèáñí èéñèäý
<i>Cyprinus carpio</i>	common carp	x'yèè	Næçá

Latin name for Fauna	Common English name (where appropriate)	Azeri Name	Russian Name
<i>Leuciscus cephalus</i>	chub	Айеэааә	Айеәәеү
<i>Pelecus cultratus</i>	ziege	Ауеуіаәәуа	хәйіу
<i>Rutilus rutilus caspicus</i>	caspian roach	Еөеі ү	Айаеа еәһі ееһеәү
<i>Salmo trutta</i>	brown trout	Öçyö әуçуеәәуüü	Еһһһу еәһі ееһеәе
Amphibians			
<i>Bufo bufo</i>	common toad	Аәә аәдә аәдәәәһу	Аәә іауеііаәіәү
<i>Bufo viridis</i>	green toad	Еәуе аәдә аәдәәәһу	Аәә çәәәәү
<i>Hyla arborea</i>	european tree frog	Аәә әәәәдәәәһу	Еәәә іауеііаәіәү
<i>Pelobates syriacus</i>	eastern spadefoot toad	Нәдәәә һәдүі һәәеәеә аәдәәәһу	хәһіі-іеәә һеәеәһеәү
<i>Rana ridibunda</i>	marsh frog	Үә аәдәәәһу	Іçәіәү еүәәәә
Reptiles			
<i>Agama caucasica</i>	caucasian agama	Аәәә ç еүеүçе	Аәә әеәәçһеәү
<i>Clemmys caspica</i>	freshwater terrapin spp.	Öçyö әуһәәәһу	хәә әәәәәһі ее һеәү
<i>Coluber schmidtii</i>	schmidt's whipsnake	Ауçуе өүеөү	І іеіç өі еәдә
<i>Cyrtopodion caspicus</i>			
<i>Elaphe hohonackeri</i>	ladder snake spp.	Çәәәәәәә өүеөүһе	І іеіç çәәәәçһеәе
<i>Emys orbicularis</i>	european pond terrapin	Аәәәеүә әуһәәәһу	хәә әәә әәәіеіәү
<i>Eremias velox</i>	rapid fringe-toed lizard	Еүеә еүдөүүүеәе	Бүдәәәәәһөдәү
<i>Eryx jaculus</i>	caucasian sand boa	Аүдә еәәәәү	Оәәә-еә çәә әәіуе
<i>Eumeces schneideri</i>	long-legged skink	Оçіәәә һһеіе	Нөеіе әеәііііәеә
<i>Gymnodactylus caspius</i>	gecko	Öçyö -үеі әәәәә үәеііо	Аәәіі әіеіі әуе еәәәçһеәе
<i>Lacerta agilis</i>	sand lizard	Нү-дәәә еүдөүүүеү	Бүәеәә і дүдәәү
<i>Lacerta saxicola</i>	rock lizard	Аәәәүә еүдөүүеүһе	Бүәеәәә һеәәүіәү
<i>Lacerta saxicola raddei</i>	Azerbaijan rock lizard	Аçүдәәәә әәәәүә еүдөүүеүһе	Бүәеәәә һеәәүіәү çәәәәәәһеәү
<i>Lacerta strigata</i>	caspian green lizard	Çіеәәеү еүдөүүеү	Бүәеәәә і іеіһәәү
<i>Lacerta trilineata</i>	balkan green lizard	Ідәәәә еүдөүүеү	Бүәеәәә һөәәіү
<i>Malpolon monspessulanus</i>	montpellier snake	Еүеүç еәәү	Çі әү үүәе-іәү
<i>Natrix natrix</i>	european grass snake	Аәә һөеәәү	Оәәіауеііаәіуе
<i>Natrix tessellata</i>	water grass snake	Нөеәәү	Оәәіәүіе
<i>Ophisops elegans</i>	snake-eyed lizard	Ае-еі ее еәәәәә еүдөүүеү	Çі әәіеіәәә һөдәіеіәү

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<i>Testudo graeca</i>	spur-thighed tortoise	АӘәуә әйрәçе оунәәүәһү	хәбә әә һәһәәçә һи һәһәәй
<i>Vipera lebetina</i>	blunt-nosed viper	Yöđçy	Апçә
Birds			
<i>Aegithalos caudatus</i>	long-tailed tit	Óçoiáioéðoá äðüäoó	Ñeieoà äeëiíioáiñòäy
<i>Alcedo atthis</i>	kingfisher	Äæüäæie	Çai íðiaie
<i>Alectoris chukar</i>	chukar	Éyëëë	Éæëëë
<i>Anas platyrhynchos</i>	mallard	Éæüéääø þäyë	Éðyëää
<i>Aquila chrysaetus</i>	golden eagle	Áyðáoó	Áæéoó
<i>Aquila nipalensis</i>	steppe eagle	xþë äðòæü	Íðæ ñoã ííé
<i>Aquila pomarina</i>	lesser spotted eagle	Èè-èè äðòææ	Í íaiðeëé i æüé
<i>Aquila rapax</i>	tawny eagle	xþë äðòæü	Íðæ ñoã ííé
<i>Ardea cinerea</i>	grey heron	Áiç ääü	Öar ëyñäðäy
<i>Ardea spp</i>	heron	Ääü	Öar ëy
<i>Ardeola ralloides</i>	squacco heron	Ñäü ääü	Öar ëy æòäy
<i>Botaurus stellaris</i>	bittern	Éðè ääáoó	Äüi ü
<i>Burhinus oedicephalus</i>	stone curlew	xíááíæ ääáí	Äääioëä
<i>Buteo buteo</i>	buzzard	Äæ ñäð	Ñäü÷ (éáþë)
<i>Buteo rufinus</i>	long-legged buzzard	xþëñäðü	Éáþë -éóðääíeë
<i>Calandrella rufescens</i>	lesser short-toed lark	Áiç oíðäüæ	Æääíðííe ñäðüé
<i>Caprimulgus europaeus</i>	nightjar	Éæ-èñäü	Éiçiaíé íäüéííääíüé
<i>Chettusia gregaria</i>	sociable plover	xþëoéáoóó íæëëëóó	Éðä-ðëä
<i>Chettusia leucura</i>	white-tailed plover	Äüáoéðoá þëoéáoóóí	Í éääëëoáääíoáiñòäy
<i>Ciconia nigra</i>	black stork	Äðäéæëyë	Äèñò ÷äíüé
<i>Ciconia ciconia</i>	white stork	Äü éæëyë	Äèñò äæüé
<i>Circus cyaneus</i>	hen harrier	Óðëä ääæëäüëüñü	Éóíü i íëæíé
<i>Coracias garrulus</i>	roller	Yþëäüüä	Ñeçíáíðííeä
<i>Corvus corone</i>	carrion crow	Äðä ääüä	Áíðííä ÷äðäy
<i>Corvus frugilegus</i>	rook	Çäüä	Äðä-
<i>Coturnix coturnix</i>	quail	Äëëäëð-éí	Í äðä æ íäüéííääíüé
<i>Egretta spp</i>	egret	Äü ääü	Öar ëy äæäy
<i>Egretta garzetta</i>	little egret	Èè-èè äü ääü	Öar ëy äæäy i æäy

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<i>Falco naumanni</i>	lesser kestrel	xpè ì óéì óéö	Í óñòæüããñòã íäý
<i>Falco tinnunculus</i>	eurasian kestrel	Áæè ì óéì óé	Í óñòæüãã íáúêííááíäý
<i>Francolinus francolinus</i>	black francolin	Óóðæ	Óóðæ-
<i>Fulica atra</i>	coot	Áããæããã	Ë ùñóðà
<i>Galerida cristata</i>	crested lark	Ëýèèèèè òíðàùæ	Æãáíðííé òíðèàòúé
<i>Garrulus glandarius</i>	jay	Çúüçúü	Ñíéèà
<i>Glareola nordmanni</i>	black-winged pratincole	xpè ùà-ãáóéóúó	Óèðéóæãñòã íäý
<i>Glareola pratincola</i>	collared pratincole	xý ý ùà-ãáóéóúó	Óèðéóæã éóáííäý
<i>Grus grus</i>	crane	Áíç áóðía	Æóðæëü ñãúé
<i>Haematopus ostralegus</i>	oystercatcher	Ñáññáüã æèèèè	Ëóèèè-ñíðíéà
<i>Haliaeetus albicilla</i>	white-tailed eagle	Áüáóéóðá äýñç äãðæü	Íðèáí ááéíðáíñò
<i>Himantopus himantopus</i>	black-winged stilt	Æéáã æèèèè	Óíáóéí-íéè
<i>Ixobrychus minutus</i>	little bittern	Ëè-èè äãáóó	Áüí ü ì æäý
<i>Larus argentatus</i>	herring gull	Ýòì óö ááüæü	xæéãñãðèñòäý
<i>Larus spp</i>	gull	Ááüæü	xæéã
<i>Melanocorypha calandra</i>	calandra lark	xpè òíðàùæü	Æãáíðííé ñòã ííé
<i>Merops apiaster</i>	bee-eater	Áüçúèü áüçèãðáóó	Úóðèà çíéíòèñòäý
<i>Merops superciliosus</i>	blue-cheeked bee-eater	Ëáüè áüçèãðáóó	Úóðèà çæáäý áæäý
<i>Milvus migrans</i>	black kite	Áðã-æüáíá	Ëíðóí-ðíúé
<i>Monticola solitarius</i>	blue rock thrush	Ýpè äãðàíéóã	Áðíçã ñéíéé èàí áíúé
<i>Motacilla alba</i>	white wagtail	Áü -æãã-á á	Óýñíáóñèááæäý
<i>Neophron percnopterus</i>	egyptian vulture	Ëææý áãðæ	Ñòðäýóíéè
<i>Netta rufina</i>	red-crested pochard	Áüðí üçúàèì æèè äæüüæ	Íúðíé èðãñíííñúé
<i>Nycticorax nycticorax</i>	night heron	Áãðúèãã	Ëãæãã
<i>Oenanthe finschii</i>	finsch's wheatear	Áðãáíéóí-ððãæè	Ëà áèà-ðííæéíäý
<i>Oenanthe isabellina</i>	isabelline wheatear	Íéíáã-ððãæè	Ëà áèà-í èýñóíüý
<i>Oenanthe oenanthe</i>	northern wheatear	Áæè-ððãæè	Ëà áèà íáúêííááíäý
<i>Otis tetrax</i>	great bustard	Áýçýè	Ñóðã ð
<i>Pandion haliaetus</i>	osprey	xæ äãðáóó	Ñéíí à
<i>Parus coeruleus</i>	blue tit	Ááü äðüáóó	Ëçíðæèà
<i>Parus major</i>	great tit	Ëðè äðüáóó	Ñéíéòà áíéüäý
<i>Passer domesticus</i>	house sparrow	Áàí ñýð-ýñè	Áíðíáæ áíí íáúé

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<i>Passer montanus</i>	tree sparrow	xbə n̄jō÷yñè	Айди́а́а́э и́йе́а́и́é
<i>Perdix perdix</i>	grey partridge	Áıç éyēēēē	Ёо́дй̄ӣ а̀ѐа̀ н̄а̀й̄
<i>Pernis apivorus</i>	honey buzzard	Áðúéáéyí	Й̄н̄и́а́а́ і́а̀у́е́й̄а́й̄у́é
<i>Phalacrocorax carbo</i>	cormorant	Éðè áàðáàòòá	А́а̀е́а́й̄ а́й̄е́у́òé
<i>Phalacrocorax pygmeus</i>	pygmy cormorant	Óúðáàáàðáàòòá	А́а̀е́а́й̄ і́ а̀е́у́é
<i>Pica pica</i>	magpie	Nāññāüā	Н̄и́д̄и́е́а
<i>Plegadis facinellus</i>	glossy ibis	Áàðááç	Е́а̀ðáááéèà
<i>Porphyrio porphyrio</i>	purple gallinule	Nóèòáðíéíóá	Нóéòáéèà
<i>Rallus aquaticus</i>	water rail	Núúúð÷ú	Й̄ а̀ñòóáé
<i>Riparia riparia</i>	sand martin	Nāüèè áàðááóó	Е́а̀ñóí÷èàáàðáíáý
<i>Sturnus vulgaris</i>	starling	Núúúð÷úí	Нéáíðá
<i>Tadorna ferruginea</i>	ruddy shelduck	Áíáòò	Й̄áàðü
<i>Tetrax tetrax</i>	little bustard	Áyçyñè	Нóðá á
<i>Turdus merula</i>	blackbird	Áàðáíéíóá	А́ðй̄çá ÷áðй̄úé
Mammals			
<i>Allactaga elater</i>	small jerboa	Éè÷èè yōyááíáðü	Óóæá÷èè і́ а̀е́у́é
<i>Allactaga williamsi</i>	mountain asian jerboa	Éè÷èè Áñèéàááü yōyááíáðü	Óóæá÷èè і́ áéíçeéñèèè áíðй̄úé
<i>Apodemus agrarius</i>	striped field mouse	xbə ñè÷áíè	Й̄ úøü і́ й̄éááý
<i>Apodemus sylvaticus</i>	common wood mouse	Й̄ áy ñè÷áíú	Й̄ úøü èáñíáý
<i>Arvicola terrestris</i>	water vole	Nó ñú÷íáóéó	Й̄ й̄éáèàáíáýíáý
<i>Barbastella barbastellus</i>	barbastelle bat	Ááðй̄ӣ à áèèáóéèüü	Øèðй̄éíóæà ááðй̄ӣ áèñèáý
<i>Canis aureus</i>	golden jackal	xáááæ	Øæáæ
<i>Canis lupus</i>	wolf	Áíááð	Áй̄èè
<i>Cervus elaphus</i>	red deer	Й̄yæá í áðæ	Й̄éáü áéááíðй̄áíúé
<i>Cricetulus migratorius</i>	grey hamster	Áıç ñè÷áíá	Óй̄ӣ ȳ÷íé ñáðüé
<i>Crocidura guldenstaedti</i>	long-tailed white-toothed shrew	Óçóíáóéðóá áüáèø	А́æй̄çóáéèà áèèй̄ӣííóáíñòáý
<i>Dryomys nitedula</i>	forest dormouse	Й̄ áy ñòéáèñèíè	Н̄й̄й̄ éáñíáý
<i>Eptesicus bottae</i>	desert serotine bat	Ñyüðáéà ðáññü	Éй̄áí і́ óñòúííúé
<i>Erinaceus concolor</i>	eastern european hedgehog	Áüáðèèèðí è	А́æááíáðóáúé
<i>Felis chaus</i>	reed cat	Áàí úæúá í èæéèè	Éìò éй̄ӣ úæáúé
<i>Felis lybica</i>	wild field cat	xbə í èæéèè	Éìò ñòá ííé

Latin name for Fauna	Common English name (where appropriate)	Azeri Name	Russian Name
<i>Felis silvestris</i>	wild cat	İ əy i eəeə	Éiəəəñiäy
<i>Gazella subgutturosa</i>	goitered gazelle	Äəəä	Äəəä
<i>Glis glis</i>	edible, fat or squirrel-tailed dormouse	Nöəəñei	Nííy-í íë÷íê
<i>Hemiechinus auritus</i>	long-eared desert hedgehog/ear shrew	Áóəäëü èèđi è	Äəəäñòúé
<i>Hyaena hyaena</i>	striped hyaena	Éəòəđ	Äəä
<i>Hystrix indica</i>	porcupine spp.	Äñeəə oèđyíäçú	Äeéíäðç eíäeéñeéé
<i>Lepus europaeus</i>	brown hare	Äəə äíâəí	Çäy -ðónäé
<i>Lutra lutra</i>	eurasian otter	xəə ñä óđó	Äüäđä
<i>Meles meles</i>	eurasian badger	İ íđñóä	Äđñóé
<i>Meriones erythrorus</i>	red-tailed sanderling	Äüđi üçüäóéđóäñóí ñè÷áíü	İ äñ÷áíèàéđäñííðáíñòäy
<i>Mesocricetus brandti</i>	brandt's hamster	Éè÷eé Äñeəäääü ñè÷áíü	Óii y÷íê i äéíäçeéñeéé
<i>Microtus socialis</i>	gunther's vole	Éəèi äè ÷bè ñè÷áíü	İ íeäèèà íáüñòäñíäy
<i>Microtus spp</i>	vole spp.	xbè ñè÷áíü	İ íeäèèà
<i>Miniopterus schreibersii</i>	schreiber's bat	Äəè óçóíäñä	Äeéíííèđüé íáüéííäñíüé
<i>Mus musculus</i>	house mouse	Ää ñè÷áíü	İ üü äíí íääy
<i>Myocastor coypus</i>	coypu	Íóððeəä	Íóððëy
<i>Myotis mystacinus</i>	whiskered bat	Äüüèü əyáí yđy	Íí÷íeəòñàòäy
<i>Neomys shelkovnikovi</i>	shelkovnikov's water shrew	ðäéíáíeéíä éóðíðäñü	Éóðíðä ðäéíáíeéíä
<i>Pipistrellus kuhli</i>	kuhl's pipistrelle	Éöèè əyáí yđyñè	Íäðíí üđü Éóëy
<i>Rattus norvegicus</i>	brown rat	Áíç ñè÷íáóé	Éóüñäñäy
<i>Rhinolophus ferrumequinum</i>	greater horseshoe bat	Äpəèè íäəáóđóí	İ íäéíáííñ áíeüðé
<i>Rhinolophus hipposideros</i>	lesser horseshoe bat	Éè÷eé íäəáóđóí	İ äèüé í íäéíáííñ
<i>Sus scrofa</i>	wild boar	xbè äííóçó	Éääí
<i>Suncus etruscus</i>	pygmy white-toothed shrew/etruscan shrew	Äüðöäí äüäèð	Ääíçóáéèèäðeéíäy
<i>Vormela peregusna</i>	marbled polecat	Ñäðñäđ	İ ääyçé à
<i>Vulpes vulpes</i>	red fox	Öeéö	Éñeəä

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3 INTRODUCTION

The South Caucasus Pipeline (SCP) will be constructed to export gas from the Shah Deniz offshore field in the Azerbaijan sector of the Caspian, via Georgia, to Turkey.

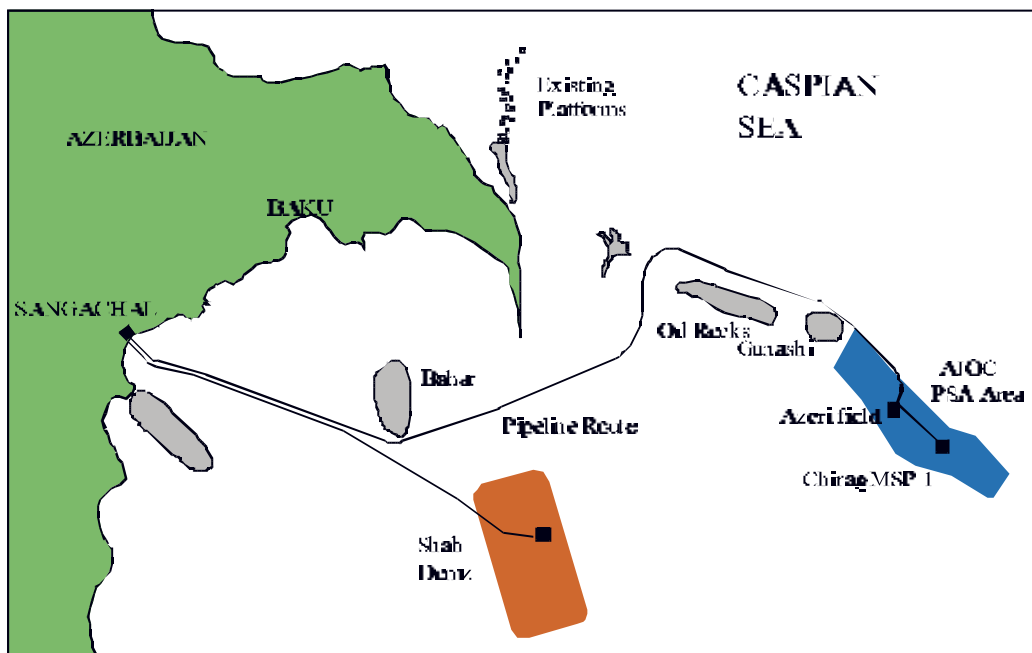
This section introduces the SCP project and the Environmental and Social Impact Assessment (ESIA) work that has been conducted in relation to the project.

Azerbaijan Environment and Technology Centre (AETC) has been responsible for the production of this ESIA on behalf of BP/the SCP Owners. URS Dames & Moore has produced an equivalent document for Georgia. ERM has contributed the Social Impact Assessment (SIA) for both countries.

3.1 THE SCP PARTNERS

The SCP partners are the seven companies with interests in the Shah Deniz offshore gas field (see Figure 3-2). The Shah Deniz gas field lies in the South Caspian, approximately 100km to the south-east of Baku in water depths ranging from 50m to 500m. The location of the gas field, the subsea pipeline route, and Sangachal onshore receiving terminal are shown in Figure 3-1.

Figure 3-1 Location of the Shah Deniz gas field in the Caspian



The SCP Partners were formed in 1999. BP has been nominated to lead the engineering design work for the project on behalf of the SCP Partners which currently includes the State Oil Company of the Azerbaijan Republic (SOCAR), Statoil, TPAO, LUK Agip NV, Total Fina-Elf and NICO (see Figure 3-2). BP is also taking the lead in managing the environmental and social issues associated with the developments, and it has been agreed that BP Health, Safety and Environmental (HSE) Policy will be adopted by the SCP Partners.

Figure 3-2 The SCP Owner Group



Throughout this document reference will be made to SCP Partners as the organization responsible for construction and operation of the pipeline in Azerbaijan and Georgia, and therefore responsible for the implementation of the commitments made in this ESIA.

During the design phases of the SCP project several international engineering firms have been contracted to provide expertise and resources to support the development of the project. John Brown Hydrocarbons (JBH) has undertaken the detailed engineering work for the SCP system. Bechtel, engineering contractors for the Baku-Tbilisi-Ceyhan (BTC) project, and JBH have been jointly responsible for all pipeline corridor and right of way (ROW) issues.

A bid process to select contractors to carry out the construction of the pipeline and associated above ground installations (AGIs) is under way, with contractors expected to be appointed sometime in the middle of 2002.

3.2 PROJECT RATIONALE

The Caspian region has abundant oil and gas reserves. The domestic demand for gas in the Caucasus and Central Asia is mostly met by current supplies and is unlikely to grow significantly in the near future. Most of the expansion in production will therefore be available for export. The domestic gas market in Turkey is expanding rapidly. The Government of Azerbaijan has negotiated a gas sales and purchase agreement with the Government of Turkey to supply Shah Deniz gas to Turkey by the end of 2005.

Not all of the gas from the development of the Shah Deniz gas field will be exported to Turkey. Sales and purchase agreements are also in development with the Governments of Azerbaijan and Georgia.

The SCP is being constructed in order to overcome the limited capacity of existing export options. At full capacity, and after additional stages of development, it is envisaged that the pipeline will export up to 16bcm/year from the existing Sangachal Terminal near Baku in Azerbaijan, through Georgia to the Georgian–Turkish border. The SCP will link up with a pipeline being constructed within Turkey to transport the gas to Erzurum, where it will enter the domestic supply grid.

The proposed development of the Shah Deniz field will yield commercially viable quantities of natural gas. It is expected that sales from stage 1 of the Shah Deniz development will be in the region of 5-8 bcm/year, rising to between 12-16 bcm/year during full field development. Build up volumes will begin in 2005 at an estimated rate 5 MMscm/day to Turkey, Georgia and Azerbaijan combined.

The SCP is considered to be the most suitable method to transport gas to Turkey from the Azerbaijan sector of the Caspian when environmental, economic and political factors are taken into consideration.

3.3 PROJECT ALTERNATIVES

Pipelines are widely recognized as the safest, most environmentally sound method of transporting natural gas. Therefore other options including road and rail transport of gas were not studied in any detail.

Within Azerbaijan, two options were considered for pipeline transportation. These were the refurbishment of the Azerigaz pipeline between Kazi-Magomed and the Georgian border, or the construction of an entirely new pipeline. An extensive testing programme was conducted to look at the feasibility of refurbishing the existing line. The results indicated that a significant amount of work would be needed to upgrade the existing line to operate at the much higher pressures required for export. Therefore the decision was made to investigate the construction of a new pipeline. This decision also provided the opportunity to maximise environmental, social and political benefits and minimise impacts through sensitive routing.

A major study was carried out to identify a pipeline corridor through the two countries, as described in Section 4, Alternatives. The outcome of this study is the SCP route, as identified in overview in Figure 3-3 and in greater detail in the maps shown in Appendix Volume 2, Environmental Route Maps.

Figure 3-3 Map of SCP pipeline route



A detailed analysis of project alternatives, including route selection, can be found in Section 4 of this document.

3.4 PROJECT DESCRIPTION

The proposed SCP will be approximately 690km long (442 km in Azerbaijan and 248 km in Georgia) and buried for its entire length. The 42" (1,066.8mm) diameter pipeline originates at the Sangachal Terminal near Baku in Azerbaijan. Within Azerbaijan the new pipeline will, for the majority of its length, be constructed parallel to the existing Western Route Export Pipeline (WREP) operated by the Azerbaijan International Operating Company (AIOC). Construction is currently scheduled to start in the spring of 2004 and the pipeline to be operational by mid to late 2005.

Design of the SCP is being carried out at the same time as, and in alignment with, the design work for the proposed BTC pipeline, which will transport crude oil from Azerbaijan to the Turkish Mediterranean port of Ceyhan and on to International markets. The proposed BTC pipeline will be approximately 1750km long and will run parallel to the SCP between the Sangachal Terminal and the Georgian-Turkish border near Arkhaltsikhe. The BTC pipeline has a planned completion date of one year earlier than the SCP and is addressed in detail in a separate ESIA report.

Figure 3-4 provides an overview of the routes of the SCP, WREP, and BTC pipeline. It also shows the Northern Route Export Pipeline (NREP) route, which takes oil from Baku to the Black Sea via Russia.

Figure 3-4 Overview map of SCP, WREP, NREP and BTC pipeline



Detailed pipeline routing and engineering design is an interactive and ongoing process. This ESIA is based on the information currently available. As the engineering design develops more information will become available and will be subject to environmental review.

3.5 SCOPE OF THIS ESIA

3.5.1 Geographical extent

The subject of this ESIA is the onshore section of the SCP within the territory of Azerbaijan. This is defined as the pipeline, and all associated facilities, between the fence-line of the Sangachal Terminal and the Azerbaijan-Georgian border.

In addition to the pipeline itself, permanent facilities within Azerbaijan necessary for the first stage of the SCP project will include:

- Gas supply infrastructure and pig launching facilities at the Sangachal Terminal (all of which have been included within a separate ESIA)
- Approximately 5 remotely operable block valve stations
- A cathodic protection (CP) system
- A fibre optic cable
- A computer-based control system

A detailed description of the SCP project in Azerbaijan can be found in Section 5.

3.5.2 Project phasing

This ESIA describes the impacts that the SCP project could potentially have upon the existing environmental and social conditions along the pipeline corridor in Azerbaijan, and how these impacts will be mitigated. However, environmental and social assessment has also fed into every stage of the project design process, significantly influencing how the project will be

developed, as shown in Figure 3-5. Therefore many of the potential impacts of the project will never be realized as steps have already been taken to avoid the impact occurring.

Table 3-1 below outlines the level of environmental and social analysis for each stage of the project design process.

Table 3-1 Inter-relationship of environmental and social assessment with the engineering and construction process

BP Internal Phase	Project Phase	Degree of Environmental and Social Analysis
Appraise	Preliminary Engineering	Screening
Select	Basic Engineering	Scoping
Define	Detailed Engineering	Environmental and Social Impact Assessment (ESIA)
Execute	Construction	Environmental and Social Management Plan
Evaluate	Operations	Environmental and Social Management Systems

A comprehensive Environmental and Social Scoping Study document was produced during the basic engineering phase and provided to key stakeholders in Azerbaijan and Georgia. This highlighted the key environmental and social issues associated with the SCP project, and provided the basis of the full ESIA to be undertaken during the detailed engineering phase. This document details that ESIA process.

The ESIA assesses the impacts of all phases of the SCP project development, from the start of construction, through commissioning, operation and eventual abandonment of the facilities.

3.6 OBJECTIVES OF THE SCP ESIA

The overall objective of the SCP ESIA process is to ensure that any potential adverse environmental or social impacts arising from pipeline construction and operation are identified, and where possible eliminated or minimised through early recognition of, and response to, these issues. Another important objective of the ESIA process is to provide a mechanism for public participation and information dissemination.

The main issues considered during the preparation of this ESIA are listed below:

- Identification, quantification and assessment of environmental and social impacts
- Comprehensive integration of environmental and social considerations and constraints into the project planning and design activities
- Demonstration that environmental and social issues will figure prominently at all stages of the project
- Thorough addressing of company policy and legal requirements
- Consultation with all stakeholders and consideration of their concerns

Where it is not possible to eliminate or minimise impact through design, the ESIA details those environmental and social mitigation measures, which have been identified in conjunction with engineering teams and stakeholders and will be implemented by the SCP Group (Sections 10 and 11). Furthermore, where appropriate, additional environmental and community investment programmes will be implemented, and are discussed in the ESIA.

Figure 3-5: Index of potential environmental impact

A3 figure to be inserted here.

Potential impacts of all stages of the project have been evaluated against applicable environmental standards, regulations and guidelines, existing environmental conditions and issues raised by stakeholders (see Section 6, Legal and Policy Framework, and Section 16, Consultation).

In addition to these primary objectives, a guiding principle for the SCP ESIA process has been to build upon experience gained during the production of previous ESIA reports in the region, and to improve upon these earlier studies where possible.

The following issues have been given additional consideration during the SCP ESIA process, as a result of experience gained during production of the WREP EIA:

- Consideration of alternatives to the proposed pipeline and alternative export routes
- A greater emphasis on socio-economic impacts and opportunities for community investment and maximizing community benefits
- A comprehensive public consultation programme including a 60-day period for responses prior to finalization of the report
- The involvement of stakeholders from outside Baku
- Greater emphasis on geohazards (eg seismic and geotechnical risk)
- Planning of ecological surveys involving local scientists to address seasonal aspects (dormant plants, animal migration and hibernation etc)
- Reviewing methods for facilitating independent review of reports
- Issuing a scoping report and inviting feedback

3.7 CURRENT STATUS OF THE ESIA

This draft of the ESIA document has been prepared specifically for public disclosure and comment. The report will be widely disseminated and will be available for comment for a period of 60 days. Following the 60-day disclosure period all comments received will be incorporated as appropriate into the ESIA, prior to formal submission to the Government.

3.8 STRUCTURE OF THE ESIA REPORT

This ESIA document comprises three volumes: the ESIA report itself, a volume of Environmental and Social Route Maps and a volume of Appendices (Technical Appendices and Environmental and Social Baseline Reports).

The structure of this ESIA has been developed by the SCP project team in order to adhere to International Financing Institution (IFI) requirements, to meet the national host government requirements as defined in the Host Government Agreements (HGAs), and to provide alignment with ISO standards for Environmental Management Systems (EMS).

This ESIA report is divided into 18 Sections, as detailed in Table 3-2.

Table 3-2 ESIA report structure

Section Number	Section Title
1	Executive Summary
2	Glossary and Latin Names
3	Introduction
4	Project Alternatives

Section Number	Section Title
5	Project Description
6	Legislation and Policy Framework
7	Environmental and Social Impact Assessment Methodology
8	Environmental Baseline
9	Socio-Economic Baseline
10	Environmental Impacts and Mitigation
11	Socioal Impacts and Mitigation
12	Residual Impacts
13	Cumulative Impacts
14	Management and Monitoring
15	Overall Project Assessment
16	Consultation
17	ESIA Contributors
18	References and Bibliography

The Appendix volume accompanying this document, comprises the following:

Technical Appendices

1. Project codes and standards
2. Regulatory review of environmental and social issues
3. Technical inventories
4. Summary of Reinstatement Plan
5. Public Consultation and Disclosure Plan – BTC and SCP Pipeline Projects, Azerbaijan

Environmental and Socio-economic Baseline Reports

1. Ecological Baseline
2. Cultural Heritage Management Plan and Archaeological Baseline Data
3. Hydrogeology Baseline
4. Traffic Assessment
5. River Corridor Survey
6. Contaminated Land
7. Geohazards
8. Geology and Soils
9. Climate and Meteorology
10. Hydrology
11. Socio-economic Baseline

Copies of the full ESIA report and a Non-Technical Executive Summary will be made widely available, with copies in Azerbaijani, English and Russian.

Where possible, the structure of this report has been developed in such a way as to allow direct comparison between the ESIA's produced for Azerbaijan and for Georgia. A number of the sections are common to both countries, and have therefore been reproduced in the same form in the two documents. A common impact identification and assessment methodology has been applied. However, within some sections, particularly Section 10, Environmental Impacts and Mitigation, there are differences in the presentation of information, which reflect the level of analysis required for specific subjects in each country.

3.9 ASSOCIATED ESIAS AND SUPPORTING DOCUMENTS

Environmental and social issues along the SCP route are covered in two separate ESIA documents, subdivided as detailed below:

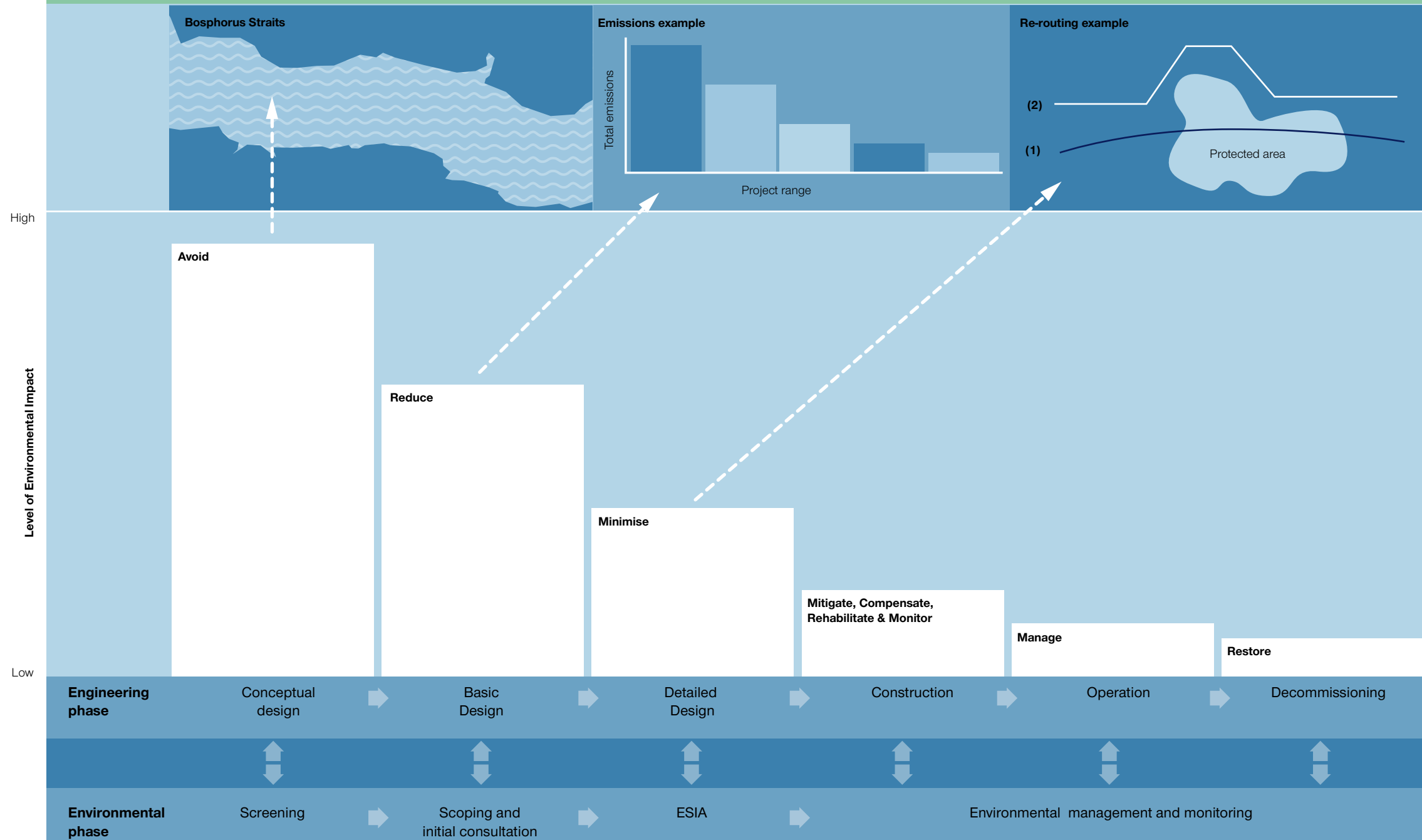
- SCP ESIA Azerbaijan - 442km of pipeline, from the Sangachal Terminal to the Azerbaijan-Georgian border (this document)
- SCP ESIA Georgian - 248km from the Azerbaijan-Georgia border to the Georgia-Turkish border

Separate ESIA reports will or have also been produced covering the following related projects:

- Shah Deniz (SD) Gas Field Development and Production (offshore development, sub sea pipeline and onshore terminal)
- BTC ESIA Azerbaijan - 442km oil pipeline, from the Sangachal Terminal to the Azerbaijan-Georgian border
- BTC ESIA Georgia - 248km oil pipeline from the Azerbaijan-Georgian border to the Georgian-Turkish border
- BTC ESIA Turkey - 1060km oil pipeline from the Georgian-Turkish border to the Ceyhan Terminal on the Mediterranean Coast
- ACG Phase 1 Upstream Oil Project (offshore development, sub-sea pipeline and onshore terminal)

Finally, a regional assessment entitled “Environmental, Social and Economic Review of ACG Full Field Development and Export in a Regional Context” has been prepared.

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4 PROJECT ALTERNATIVES

4.1 INTRODUCTION

The SCP project, as described in Section 5 of this report, represents the results of a process of assessment of alternative options for the export of gas produced from the Shah Deniz and other fields in the Azerbaijan sector of the Caspian to the Georgian and Turkish markets. This Project Alternatives Section describes the process that has led to the adoption of the SCP project as described in Section 5.

A primary driver for the SCP gas export route was the market. Unlike oil, which is sold onto an open market, gas sales are tied to a specific delivery point underpinned by gas sales and purchasing agreements. It was identified that Turkey had the market capacity, economic growth predictions and financial ability to take and pay for the SCP gas. Therefore a sales and purchasing agreement was secured with the Turkish Government.

Once the gas sales and delivery point had been agreed an assessment of alternative export options was undertaken. The assessment was a phased process, starting with a consideration of the best method for transportation of the gas, followed by a comprehensive assessment of the best corridor for a pipeline and then looking in great detail at the exact route alignment within that corridor. This process is described in detail in Section 4.3, Transportation method and Section 4.6, Routing, below.

The options for transporting line pipe and equipment to the host countries, and onward to the project construction areas have also been the subject of a detailed assessment. This review of logistics options has also included a consideration of access roads, construction camps, and line-pipe storage areas that could be utilized for the project. The assessment of alternatives for these issues is dealt with in Section 4.7, Logistics options.

Considerable effort has also gone in to optimizing the design of the pipeline system to maximise its operability, minimise its cost and minimise environmental impact where practical. The assessment of alternative design options is described in detail in Section 4.8, Design options.

However, before embarking on a detailed study to assess the relative merits of various export options it was necessary to consider the impacts of the “No-development Option”, that is what would be the results of not developing any additional export capacity for Azerbaijan gas. In this way an informed decision on the merits of pursuing an export solution could be made.

4.2 NO-DEVELOPMENT OPTION

No development of the SCP project would remove all potential environmental and social impacts due to construction and operation.

A number of potential positive effects were identified that would not be realized should the project not proceed, including the financial benefits to Azerbaijan arising from the sale of gas and the social and economic benefits associated with gas take-off in Georgia. The no-development option would also mean that specific environmental and social benefits that may accrue as a result of the SCP project, such as increased employment opportunities, infrastructure upgrades, and other community benefits would not occur.

If the SCP project were not to be progressed alternative export options would need to be found. In addition the development of the Shah Deniz gas field in the Caspian would not be viable with wide ranging negative impacts on the economy of Azerbaijan and neighbouring countries.

If the SCP were not developed this would increase the demand for alternative export solutions from the Caspian and may lead to other projects being proposed that entail a greater degree of environmental risk, for example proposals that require alternative pipeline routes through areas of higher risk (terrain and security).

If the Shah Deniz gas field is not developed this would effectively deprive Azerbaijan, Georgia and Turkey of a relatively clean, economically viable source of energy. This would in turn increase reliance upon dirtier fuels such as mazute and oil, which are currently used to provide a proportion of the region's power. Sales and purchase agreements are being developed with both Azerbaijan and Georgia to ensure that they benefit from increased availability of gas.

Development of the Shah Deniz field increases the ability of Azerbaijan to be self-sufficient in terms of energy, and less reliant on gas imports from neighbouring countries.

The no-development option was therefore dismissed on financial, environmental and social grounds, and the decision made to identify the most suitable export option for gas from the Shah Deniz field in the Caspian.

4.3 TRANSPORTATION METHOD

Once it had been determined that it was appropriate to assess methods for exporting a proportion of Shah Deniz gas to international markets a decision was needed on the primary transportation method to be used. A number of transportation mechanisms were considered including:

- Gas transmission pipeline to export markets
- Gas transmission pipeline to adjacent markets and trade swap
- Gas by wire
- Liquefied Natural Gas (LNG) export via marine, rail or road tanker
- Using the gas as a feed stock for local process industries

Iran was identified as the most likely destination for an export pipeline and trade swap. However, this was precluded due to continued sanctions against Iran.

Gas by wire was considered and discounted because of the distances involved and energy losses associated with power transmission. This option also has a greater visual impact than all other options. The economic viability of cross border power supplies is also less attractive.

LNG export (via marine, rail and road tanker) was eliminated for market reasons. Japan is the only significant customer for baseload LNG and Azerbaijan is not strategically located for this market. LNG is becoming less important as an energy source in Turkey, Greece and other Mediterranean and European countries. The market demand is for natural gas via pipeline.

Therefore the economics of LNG are marginal in world markets. In addition LNG export is environmentally unattractive due to the large number of marine/rail/road vehicle trips required, the impacts of fugitive emissions and the likely loss of inventory. This mode of transport would also entail significant safety and environmental risks. For example the risk of collision is greater where a large number of vehicles are involved (marine, road or rail).

The market does not exist in Azerbaijan to use the gas as a feedstock for local industries.

Therefore it was determined that export to markets by pipeline would be the primary transportation method for Shah Deniz gas.

Pipelines are universally accepted to be the safest, most cost effective and environmentally sound method of transporting gas. The main risk of pipeline damage is from third parties and there is scope to minimise this risk (and others) as far as possible by careful pipeline routing, design, monitoring and management.

Shah Deniz gas has some associated condensate. This condensate will be removed from the gas before the gas enters the export pipeline. The condensate will be fed into either the WREP or BTC oil pipeline.

4.4 EXPORT COUNTRY

For economic, geographical and political export reasons Turkey has been identified as the most suitable export destination for the gas.

The reasons for selecting Turkey as the destination for the gas include:

- Support has been forthcoming from the Azerbaijan Government for selling gas to Turkey
- A gas sales agreement has been reached between Azerbaijan and Turkey, that specifies the point of sale as the Georgian-Turkish border
- Georgia has expressed its willingness and support to be a transit country; subsequently this support has been enacted into leading edge transit and investor protection laws.
- Turkey has a sufficiently strong economy to be able to pay for the gas
- Turkey has a large internal market for gas
- The pipeline to Turkey has been calculated to be economically viable

Alternative countries to Turkey (Russia, Iran and Armenia etc) were rejected for various reasons, (Section 4.6.1) but mainly on the basis that they were not considered to be economically viable and that major constraints were evident.

4.5 NEW PIPELINE VERSUS REFURBISHMENT OF AN EXISTING PIPELINE

Two options existed for pipeline transportation of Shah Deniz gas within Azerbaijan, namely:

- Construction of a new pipeline
- Refurbishment of an existing Azerigaz pipeline

The refurbishment option comprized the rehabilitation of an existing Azerigaz pipeline between Kazi-Magomed and the Georgian border, with a new section of pipeline linking Sangachal Terminal with Kazi-Magomed.

An extensive survey programme looked at the feasibility of refurbishing the existing line. This showed that the existing pipeline was in a poor condition, cathodic protection systems had been non-operative for 10 years and coatings had started to break down and delaminate. Testing indicated that the structural integrity of the pipeline was poor and unable to cope with the flows and pressures required by the transmission system.

A large amount of upgrading work would have been necessary in order to make the old Azerigaz pipe suitable for safe operation at the higher pressures required. Even then, for technical reasons, the capacity of the refurbished pipeline would be substantially less than an equivalent new build pipeline. Eventually additional sections of pipeline would be required to be constructed as export gas volumes increased. Therefore the decision was made to investigate the construction of a new pipeline and use this as an opportunity to maximise the environmental, social and political benefits through sensitive routing.

Primary importance was placed on the selection of a route that could be constructed and operated with a minimum of risk to personnel and infrastructure with particular reference to third party interference. Following this, significant constraints were evaluated in terms of their potential to affect the construction and operation of the pipeline. Constraints considered included environmental, construction, social, security, cost and access issues.

4.6 ROUTING

4.6.1 Regional routing

The regional routing of the SCP was contingent on the point of sale of the gas to the Turkish gas transportation agencies. This point of sales was determined as the Georgian – Turkish Border. This in turn was determined by the point of access into the Turkish domestic gas grid, which the Turkish Government has set as Erzurum.

Therefore, based on these commercial agreements the SCP was routed through Azerbaijan and Georgia to cross the Georgian – Turkish border at the town of Vale, as shown in Figure 3-3.

4.6.2 National routing

4.6.2.1 The process

After deciding upon Turkey via Georgia as the most suitable route for a new pipeline, an intensive study was carried out to look at all the routing options across Azerbaijan and Georgia. The option evaluation process took into account issues such as terrain, environmental and social constraints, security, safety, constructability, cost, schedule, and operational issues.

For linear developments such as pipelines the key process for managing potential negative environmental and social impacts is to identify the least sensitive route. It is obviously preferable to avoid creating a potential impact in the first instance. Therefore a great deal of work has gone into ensuring that the route selected for the SCP minimises environmental and social impact by re-routing, where possible, away from constraints.

A Geographical Information System (GIS) was used as a tool to manage, interrogate and interpret all data collected during the routing process. The GIS was then used to develop a series of constraints maps and to evaluate various route options at a national level.

This process initially involved the designation of constraint areas which should be avoided wherever practical and some areas, for example security zones, that had to be avoided. Primary importance was placed on the selection of a route that could be constructed and operated with a minimum of risk to personnel and infrastructure owing to third party interference. Following this, significant constraints were evaluated in terms of their potential to affect the construction and operation of the pipeline. Constraints considered included environmental, terrain (geohazard) construction, social, security, cost and access issues.

In order to ensure that geotechnical risks were fed into the routing process a desktop study based on satellite imagery was undertaken to identify primary geomorphological terrain units. This was validated by “ground truthing” and the results fed into the constraint mapping.

The importance of a robust and thorough route selection process was recognized as being the key to avoiding and managing potential environmental and social impacts. The following basic principles were adopted:

- Use of multi-disciplinary teams with recognized expertise in pipeline route development
- Avoidance where practical of known designated sensitive areas
- Constant verification of the route through field surveys and reviews
- Avoidance of densely populated areas and areas of known or potential future development as defined by the requirements of ASME 31.8
- Avoidance of known cultural monuments where practical
- Avoidance of known geohazards
- Avoidance of high risk security areas or areas of regional instability
- Minimizing land-take
- Maximizing reinstatement potential

4.6.2.2 Corridor selection & narrowing

The SCP HGAs define the route corridor optimisation process that is common to both countries, as described in Sections 4.6.3 - 4.6.5.

4.6.3 10km “Corridor of Interest”

During the year 2000, multidisciplinary studies were conducted to identify a 10km wide “Corridor of Interest” through the SCP host countries, in accordance with the HGAs. A common corridor was selected for both the SCP gas line and the BTC oil line, reducing substantially the potential social and environmental impacts should both projects proceed, in line with the Project’s Environmental and Social Goals (Section 6), as follows:

- Reduction in total area of land clearance; habitat and agricultural land lost
- Reduction in number of temporary facilities (camps, pipe storage yards, access roads etc) required
- Provision of BTC pump facilities with access to SCP gas, so allowing pumps to be driven on gas, rather than crude (contingent upon SCP approval)

In Azerbaijan, the studies focused on confirming the suitability of the existing WREP corridor as a common alignment for the SCP and BTC lines, thus avoiding opening a second or third energy transportation corridor, and minimizing land-take. This route also followed the main infrastructure corridor of road and railways to Tbilisi and avoided environmentally sensitive areas.

The WREP was built along a route previously identified by Soviet engineers. The SCP project has been able to draw upon much of the experience and knowledge gained during WREP construction in the routing of the SCP.

Specifically, several environmentally or socially sensitive areas were avoided, or the route through them was minimised, from the outset of this project by the following measures:

- Shortening of the route by approximately 12km through the sensitive Gobustan semi-desert habitat
- Avoiding the Korchay State Forbidden Area (KP 285-295), which is crossed by the WREP
- Avoiding the Shamkir State Forbidden Area (KP 330-370), which is crossed by the WREP
- Avoiding resettlement of people or movement of buildings and minimizing disruption to settlements, and public buildings such as schools

Re-routes to avoid the Karayazi Aquifer (KP 410-442) were considered in detail, but have been discounted owing to the other constraints present in the region (a full report on this issue has been prepared and issued to the Ministry for Ecology and Natural Resources (MENR)).

These and other detailed routing issues in Azerbaijan are discussed in Section 4.6.6 below.

Adoption of a common “energy corridor” within Azerbaijan will minimise the environmental and social disturbance associated with the construction of the three separate pipelines (WREP, SCP and BTC pipeline). This is discussed further in Section 13, Cumulative Impacts.

Following the route of the existing WREP also maximised the advantages of constructing the pipeline in the Kura River valley, which:

- Provides the obvious natural corridor for a pipeline to the west given the topography of the country (ie Greater Caucasus mountains to the north and Lesser Caucasus mountains to the south)
- Is low lying and largely flat (with the exception of the initial section through Gobustan and some of the river valleys)
- Is an established pipeline and infrastructure corridor
- Allows significant synergies in terms of land acquisition and pipeline operations as it is near an existing BP operated pipeline
- Does not pass directly through any major settlements

The 10km Corridor of Interest for SCP and BTC pipeline was submitted to the Azerbaijani Government in November 2000. The Government provided comments on the 10km corridor in January 2001.

4.6.4 500m “Preferred Corridor”

The comments from the Government of Azerbaijan on the 10km Corridor of Interest were used in conjunction with further detailed desk and field environmental, social and engineering studies to identify a 500m “Preferred Corridor” within the 10km Corridor of Interest.

The 500m Corridor was presented to the Government in April 2001. Within Azerbaijan the key environmental issue raised by the Government on the 500m submission was the potential interaction of the pipelines with sensitive groundwater resources.

4.6.5 100m “Specified Corridor”

Further work, predominantly field-based, was undertaken to identify specific terrain (geohazard), environmental, social, and constructability issues that needed to be resolved. These surveys included:

- Detailed geotechnical surveys of geohazards
- Acquisition and analysis of ortho-rectified aerial photographs
- Detailed topographic surveys of the pipeline corridor and identification of third party services crossing the route
- Detailed survey of all rivers, including engineering, environmental and geomorphological assessments
- Detailed assessment of dry gorges and the identification of potential mudslide areas
- Detailed seismic survey locating active fault lines with surface eruptions
- Detailed CP survey, including soil resistivity data acquisition and identification of other adjacent structures which potentially provide AC induction
- Surveys of access roads and other logistics infrastructure
- Detailed assessment of all planned crossings
- Identification of dwellings, isolated farms and buildings through analysis of ortho-rectified aerial photographs
- Botanical surveys
- Zoological surveys
- Archaeological desk and field studies

This information was used to generate a 100m Corridor that was presented to the Government of Azerbaijan in September 2001.

4.6.6 The “Construction Corridor”

Additional work was undertaken to further refine the 100m Corridor to produce a 44m “Construction Corridor”.

This stage of the route refinement process comprised the following key activities:

- Detailed re-instatement survey, including the classification of potential erosion areas and existing flora requiring re-instatement. Specific attention was paid to the highly erodable soils found in Gobustan and the impact snow melt and heavy rainfall has on the erosion of non-re-instated soils
- Assessment by environmental specialists including botanists and zoologists to identify sensitive receptors
- Detailed assessment of archaeological sites
- Assessment by social specialists of communities adjacent to the corridor
- Further detailed geotechnical surveys of landslide areas and other geohazards
- Use of aerial photographs to carry out population studies as part of the risk assessment process
- Further detailed topographic surveys to incorporate minor route changes
- Further detailed survey of major river crossings including the Kura and Shamkirchay, including the collection of river bed sediment samples to assist with the calculation of river scour depths and the completion of topographical cross sections at 500m centres up and down stream of the crossing
- Final refinement of seismic survey data to locate the pipeline fault crossing locations
- Refinement of access roads and other logistics infrastructure requirements

Most of the pipeline construction activities will be restricted to the construction corridor, although some limited work outside of this area will be undertaken, typically including:

- Construction of AGI's

- Construction at crossings where deeper open-cut excavation may be required
- Horizontal Directional Drilling (HDD) header installations
- Other areas where construction work cannot be retained within the “construction corridor” due to health and safety reasons.

The works will also comprise some pipeline construction related activities off the construction corridor, including:

- Construction of new, and upgrade of existing, access roads
- Construction and re-instatement of camp facilities
- Construction and re-instatement of line-pipe storage areas and rail spurs

4.6.7 Local routing issues

As stated above, the base case for the route of the line in Azerbaijan was to parallel the existing WREP wherever practical. However, experience of the WREP construction and a series of detailed field surveys indicated that a number of environmental and other constraints meant that diversions away from the WREP in certain sections would be required. Additionally, the requirements of Western Pipeline codes adopt different pipeline proximity criteria from the Russian codes used to design the WREP, hence short deviations in route.

The more significant deviations are discussed below.

4.6.7.1 Gobustan Desert Area (KP0 – KP15)

The WREP runs north from the Sangachal Terminal before turning to the south-west and re-joining the proposed route of the SCP at approximately KP15. The decision was taken not to follow the WREP in this area and to run the SCP due west out of Sangachal Terminal. This has the advantage of shortening the length of the SCP by 12km compared to the WREP.

As well as having financial benefits in terms of reduced capital outlay this also decreases the length of line to be constructed in the sensitive Gobustan semi-desert habitat that has a long botanical recovery rate. In addition, it reduces the length of SCP that crosses the proposed Gobustan National Park. The area is proposed as a National Park primarily for its desert habitat and botanical interest, although it has been severely degraded by anthropogenic activity.

Routing the SCP in this way does mean that the line crosses the Gobustan Cultural Reserve for 900m. It has not been possible to avoid the Reserve completely due primarily to terrain constraints to the north and restrictions on the location for crossing the Djeyrankechmes river immediately to east. However, every effort has been made to minimise the length of the Reserve crossed. See Figure 4-2.

The Gobustan Cultural Reserve is designated primarily to protect the numerous examples of rock art that are found on the rocky outcrops in the area. The pipeline route is approximately 1km from the nearest rock outcrop depicting art and therefore does not impact upon any of these features.

4.6.7.2 Shamkir and Korchay State Forbidden Areas (KP285 - 295 and KP330 - 370)

At the outset of the routing process a decision was made to avoid areas designated for nature conservation wherever practical. The boundaries of all known Reserves were therefore incorporated into the GIS and used in the definition of the 10km corridor of interest. The existing WREP crosses the edge of two areas designated for nature protection, the Shamkir and Korchay

State Forbidden Areas. The route of the WREP was pre-determined by Soviet engineers prior to AIOC taking over and upgrading the pipeline.

Field teams comprised of engineers and environmental specialists identified a route for the SCP that avoided both of these areas, by routing further to the south, as shown in Figure 4-3.

4.6.7.3 Kura East River Crossing (KP223.5)

The route of the SCP has been changed slightly from that taken by the WREP in the vicinity of the east Kura river crossing. The WREP crosses a number of cut-off meanders of the river (ox-bow lakes) that are of some ecological interest. The SCP has been routed to avoid all of these features, as shown in Figure 4-4.

4.6.7.4 Karayazi Aquifer (KP411 – 442)

It is known that one of the key environmental sensitivities along the proposed pipeline corridor are the groundwater resources in the western half of the corridor, particularly those termed the Karayazi aquifer to the north of the Kura river adjacent to the Georgian border.

For the BTC oil line, groundwater resources are one of the key environmental parameters due to the potential for impact in the event of a leak from the line.

Figure 4-2 SCP route in the Gobustan Area

A3 Figure to be inserted.

Figure 4-3 SCP route in relation to Shamkir and Korchay State Forbidden Areas

A3 Figure to be inserted.

Figure 4-4 SCP route at the Kura East River Crossing

A3 Figure to be inserted.

This potential impact does not exist in the case of the gas pipeline. This routing discussion on the Karayazi area has been included for completeness.

A study was carried out to determine whether there were potential routes in the Azerbaijan – Georgia border area that avoided the aquifer region as defined. Routes to the south and the north of Lake Jandar, and to the south of the Kura river were explored. However, it was found that a number of additional constraints ruled out any of these alternative routes. These constraints included:

- Terrain constraints (highly erodable gullies and hills) to the north of lake Jandar
- Military constraints and concerns over safety in the area to the east of lake Jandar
- Security concerns in the area to the south of the Kura river owing to the proximity to disputed regions
- Environmental constraints, particularly the fact that lake Jandar is a proposed Ramsar site. Consequently there was a desire to maximise the distance from the lake and to maintain the pipelines to the south, and therefore downslope, of the lake
- Construction constraints in terms of access of vehicles and equipment to the area to the north of the lake

Allied with the benefits described earlier of maintaining one common corridor wherever possible, and avoiding the opening up of another corridor, it was felt appropriate to align the SCP with the WREP in this region, as shown in Figure 4-5.

4.6.8 Avoiding social impact

The route of the SCP has been carefully selected to minimise impact upon the communities along the route. Consultations and discussions have been held with all communities within 2km of the route to determine their key areas of concern. This has fed directly into the project design process (see Sections 11, Social Impacts and Mitigation).

It is currently envisaged that no one will be required to move from their homes or communities as a direct result of the project. However, a full Resettlement Action Plan is being produced to fully describe the land acquisition and compensation process, and to address economic displacement issues.

The route of the pipeline has also been selected to minimise disruption to sensitive crops such as vineyards, orchards and cotton plantations.

4.7 LOGISTICS OPTIONS

4.7.1 Transport of pipe and equipment

A number of modes of transport have been assessed for the transport of line pipe, materials and other large equipment to the host countries, and within the host countries to the project areas. Options considered have included:

- Sea
- Land
 - Rail

Figure 4-5: SCP route in the vicinity of the Azerbaijan - Georgia border

A3 Figure to be inserted

- Road
- Air
- A combination of the above

The determination of the most suitable transport method has included consideration of issues such as safety, the quantities of pipe and material that could be transported, delivery schedules, environmental impact and cost.

Based on assessment of the above it was determined that transport by ship was the most appropriate primary method of delivering line-pipe and large equipment for the project.

The only viable routes into the project host countries by ship are through the Black Sea and the Volga Don canal. The Volga Don is blocked to traffic for periods of the year by ice, and therefore not a reliable transport alternative for the ongoing delivery of line pipe. Therefore it was decided to bring all line pipe into Georgia, via existing ports on the Black Sea coast. These ports, eg Poti and Batumi, generally have adequate or improvable facilities with good road and rail connections for onward transport of equipment.

From the port facilities it is necessary to move pipe and equipment to the project area. Three options were considered for this onward transport, road, rail and air.

4.7.1.1 Road, rail and air

Rail transport is generally much safer than road transport as an option for transporting line pipe, materials and other equipment as there is less interaction with other users. It also provides a more fuel efficient transport option, and has less negative environmental and social impact in terms of emissions, noise and general nuisance.

The road network is generally in a bad state of repair, would require a high degree of upgrade, and does not generally conform to the pipeline route. Therefore to transport line-pipe, materials and other equipment from the ports in Georgia to storage areas by road would result in a greater impact on the local population in terms of noise, dust and interference.

Air is by far the most expensive of the options for moving line pipe, materials and equipment. However, the safety record of air transport is superior to road transport. There is a problem with the availability of resources of an appropriate standard in country, both in terms of airplanes and air-fields. Therefore if air transport were to be used for moving line pipe, materials and equipment it would be necessary to construct new facilities. As a result air transport is being considered only for rapid evacuation or emergency response scenarios as opposed to transport of equipment or pipe.

For these reasons rail transport is preferred as the primary mode of transporting line pipe and equipment to project laydown areas where it will be transferred to truck for onward movement to the workfront. Some upgrade of existing rail spurs will be required to improve the available infrastructure, and provide access to identified storage areas.

4.7.2 Construction camps, pipe yards and associated access roads

Field surveys have identified a number of potential locations for construction camps, pipe yards and the associated access roads from these locations to the pipeline ROW. These potential locations have been subject to environmental and social assessment, and focused consultation has been conducted in communities adjacent to these areas.

It is the responsibility of the construction contractor to determine which of these alternative locations will be adopted, based on the construction strategy and schedule.

If the construction contractor proposes any previously unidentified camps or storage yards then the contractor must undertake environmental and social assessments of these locations.

A number of criteria were used in the determination of these potential sites, as described below.

4.7.2.1 Construction camps

Criteria used to determine the potential construction camp locations included:

- No adverse impact upon environmental sensitivities
- Located sufficiently far from settlements as to not cause a nuisance but without removing the opportunity for positive social interaction (eg supply of goods and services)
- Ability for transport to and from the site to the project areas to meet the HSE objectives, ie no night driving
- Provide room for expansion if required
- Proximity to the ROW
- Proximity to reliable local utilities services, eg electricity and water

4.7.2.2 Line-pipe storage yards

Criteria used to determine the potential line-pipe storage yard locations included:

- No adverse impact upon environmental sensitivities
- Located sufficiently far from settlements as to not cause a nuisance
- Proximity to exiting or upgradeable rail spur access
- Ability for transport to and from the site to the project areas to meet the HSE objectives, ie no night driving
- Proximity to the ROW
- Proximity to reliable local utilities services, eg electricity and water

4.7.2.3 Access roads

The route of the temporary access roads from the camps and line-pipe storage areas to the ROW is dependent upon the location of these facilities in relation to the ROW. Existing roads, some of which will require upgrade, will be used wherever possible. The ROW will also be used as a running track for the movement of line pipe to the construction spread.

4.8 DESIGN OPTIONS

The engineering design of the pipeline is an iterative process, with increasing definition being added to the base case design as more information becomes available, as more studies are completed, or as external circumstances change eg political and commercial requirements.

This section describes some of the key design decisions that have been necessary, and explains how these have been arrived at. It also places the preferred base-case project design described in Section 5 in a wider context.

Key engineering decisions described in more detail below include:

- Use of adjacent or geographically separated corridors for BTC pipeline and SCP
- Selection of design contractors
- Pipeline diameter
- Pipeline wall thickness
- Number and location of block valves
- Gas driven power or heat generation equipment selection

The following sections discuss each of the above.

4.8.1 Use of adjacent or geographically separated corridors for BTC pipeline and SCP

It is proposed that the BTC pipeline and the SCP share adjacent corridors through Azerbaijan. From an environmental and social perspective this has the following benefits:

- It reduces the total area of clearance and therefore temporary habitat and agricultural land-loss
- It reduces the number of temporary facilities (camps, pipe storage yard etc) established within Azerbaijan during the proposed construction period
- It provides BTC pipeline facilities with future access to SCP gas with the minimum additional infrastructure development. Future operation of BTC facilities using SCP gas will provide a number of environmental benefits (discussed below)
- Joint use of a corridor carefully selected to minimise environmental and social impacts where practical (see Section 4.4 above)

Cumulative impacts posed by pipeline construction within the same corridor are discussed in Section 13.

4.8.2 Selection of design contractors

A competitive tender process was used to select the contractor company to conduct the engineering design for the SCP project. Retaining the correct contractor was considered to be an essential aspect of optimizing project design and ensuring overall success of the project.

The successful contractor was selected after review of bids against a number of criteria, including:

- Relevant experience (projects and regional)
- Experience of personnel
- Cost
- Environmental and social performance
- Health and safety performance
- Schedule

Following the tender review process, John Brown Hydrocarbons were selected as the lead engineers for the SCP project. John Brown Hydrocarbons and Bechtel, lead engineers for the BTC oil line, share responsibility for pipeline corridor and ROW issues.

4.8.3 Pipeline diameter

As noted in Section 5, considerable engineering investigation has been undertaken into the hydraulic design of the pipeline and associated facilities. Hydraulic studies have been undertaken for 1219.2mm (48"), 1066.8mm (42") and 914.4mm (36") diameter pipelines. These studies have demonstrated that the 42" diameter pipeline was the optimum diameter from both engineering and environmental standpoints for the section of the SCP through Azerbaijan.

A major environmental benefit associated with a 42" pipeline is that outside of Sangachal Terminal no compressor stations would be required within Azerbaijan, at this time, resulting in:

- Improved safety
- Reduced permanent land-take for the project
- Reduction in greenhouse gas and nitrogen dioxide emissions from project operations
- Likely reduction in waste from construction and operation
- Ability to transport additional volumes of gas from Shah Deniz Full Field Development or other Caspian gas supplies at a future date, through the addition of a compressor station

4.8.4 Pipeline wall thickness

The selection of the material properties and the wall thickness of the line-pipe to be used for each section of the SCP have been determined on the basis of:

- International standards and design guidelines
- The loads that will be applied to the pipe, ie the internal pressures
- Local environmental and social sensitivities, including seismic zones, river crossings, proximity to existing communities and their likelihood for future expansion
- Manufacturers' standard production specifications
- Limiting factors associated with the constructability of the SCP (eg ease of welding) and the robustness of the line pipe during construction operations

As a result of engineering analysis, it is anticipated that the minimum pipewall thickness will be 12.7mm.

4.8.5 Number and location of block valves

Block valves are to be installed on the pipeline to provide the capability to isolate sections of the line in case of accidents, damage and for maintenance or repair purposes.

A comprehensive safety risk assessment has been carried out, the results of which were used to refine the location of pipeline valves. Section 10.4 explains the results of this process.

4.8.6 Power generation

Provision of a reliable local supply of electrical power is not always possible within Azerbaijan, and remotely-generating electricity was not technically preferred or economically feasible.

Power requirements for each facility have been studied and assessed in the context of a Best Practical Environmental Option (BPEO) Study. The facilities covered by the BPEO are as follows:

- Main facilities

- The remote block valve stations
- The construction camps
- Pipe storage yards

4.8.6.1 Main facilities

Within Azerbaijan it has been possible to optimize the SCP system design such that there are no main facilities (eg compressor stations) required for Stage 1 of the gas export project.

4.8.6.2 Remote block valve stations

There are several options for producing the power output required to drive remotely actuated block valve stations. However the selection was based on the most efficient sources available and on that basis the adoption of oil valve actuator technology was chosen. (See Section 5 Project Description).

4.8.6.3 Construction camps

Diesel generators are the preferred option for power generation at the construction camps. Low emissions and low noise generation have been specified to minimise the environmental impacts of this option.

4.8.6.4 Pipe storage yards

The supply of power to the railway system is one of the most reliable supplies in Azerbaijan. Therefore it is envisaged that power will be drawn from the railway network to supply the rail spurs and line-pipe storage areas. There will be a need for diesel generators as a back-up.

4.9 CONSTRUCTION

4.9.1 Selection of construction contractors

A competitive tender process is under way to select contractor companies to construct the pipeline and associated facilities.

It is recognized that selection of a qualified and experienced contractor, and ensuring that the appropriate requirements are incorporated into the contract, is an integral component of achieving the commitments set out in this ESIA report.

Therefore both environmental and social issues were afforded a high degree of priority in the invitation to tender documents. Requirements to implement the mitigation measures set out in this ESIA are set out in the invitation to tender documents and will be further addressed in pre-contract award negotiations.

The successful contractor/s will be selected after bid review, on the basis of a number of criteria, including how they have addressed environmental and social concerns.

Specifically, from an environmental and social perspective, the bids will be reviewed against:

- Training plans for HSE issues
- Proposals for managing environmental and social issues, eg maximizing local employment and management of wastes

- Adherence to the project environmental goals and project social objectives
- Compliance with relevant standards, policies and regulations
- Demonstrated awareness of relevant environmental and social issues
- Responses to an environmental and social questionnaire
- Proposed resources and structure for managing environmental and social issues

The selected contractor is required to develop an environmental and social management plan outlining how the commitments made in their bid will be implemented during construction.

4.10 BASE CASE PROJECT DESIGN

This section has summarized some of the key project alternatives and options that have been assessed which have a significant bearing on the overall environmental and social impact of the SCP project. This continual process of environmental and social input to the project design has contributed to the adoption of a base case for the SCP project in Azerbaijan. This base-case design is described in detail in Section 5, Project Description.

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6. LEGISLATION AND POLICY FRAMEWORK

This section of the ESIA outlines the legislation, standards and policies applicable to the SCP Project in Azerbaijan in two sub-sections. The first sets out the environmental legislative and policy framework and the second sets out the social legislative and policy framework.

6.1 ENVIRONMENTAL LEGISLATION AND POLICY FRAMEWORK

6.1.1 Introduction

The SCP Project will be designed, built and operated in a manner intended to conform with a number of legislative and regulatory requirements and other guidelines and policies, the main categories of which are set forth below:

- National legislation (including the Intergovernmental Agreement and Host Government Agreement – the IGA and HGA, respectively – which form a prevailing legal regime under domestic law in Azerbaijan)
- International Finance Institution (IFI) Policies
- International Conventions in force in Azerbaijan
- BP Corporate Policies

The standards set forth in international treaties (including the IGA and the HGA) are considered an integral part of Azerbaijan national legal system and override national legislation to the extent such national legislation is inconsistent, with the exception of the Constitution of the Azerbaijan Republic and laws adopted by Referenda. Accordingly, the complete range of standards applicable to the SCP Project in Azerbaijan includes not only what is set forth in the IGA and the HGA, but also Azerbaijani environmental legislation and applicable international standards and guidelines to the extent that they are not inconsistent with the IGA and HGA. Finally, while the applicable national legislative and regulatory requirements together establish the minimum standards of performance below which the conduct of SCP Project Activities must not fall as a matter of law, the SCP Project will also be implemented in accordance with standards, practices and guidelines requiring conduct that will in many instances exceed those legal requirements. These include BP's corporate Health, Safety and Environment (HSE) policies and the requirements of various IFIs with which SCP may agree to comply as part of any potential SCP Project financing.

This section of the ESIA discusses the relevance of each of these to the SCP project. The descriptions of the IGA, HGA and other laws and documents included below are summaries only and are qualified by reference to the full text of the actual laws or documents.

6.1.2 National Legislation

The national environmental legislation applicable to the SCP Project comprises the following sources of law listed hierarchically in accordance with the Constitution and other laws of the Azerbaijan Republic :

- The Constitution
- The IGA and the HGA

- The existing laws of Azerbaijan on environmental protection, safety and emergency situations, to the extent they do not conflict with the IGA and HGA
- Other regulatory requirements as set forth inter alia in various Presidential Decrees, to the extent they do not conflict with the IGA and HGA

The national environmental legislation applicable to the SCP Project, moreover, is covered by a covenant from the Government of Azerbaijan to the SCP Participants to restore the initial Economic Equilibrium in case of any negative change to the national legislation in force as of the Effective Date (See Section 7.2(x) of the HGA). Obviously, the policies of both BP and the IFIs will be applied to the SCP Project, as they exist from time to time regardless of this stability covenant.

Each of these pieces of legislation is reviewed below.

6.1.2.1 The Constitution

The Constitution is the governing law of the Azerbaijan Republic and prevails over any other national legislation or international agreements. It stipulates basic rights of people to live in healthy environmental conditions [ART. 39.I.], have access to accurate information regarding environmental conditions and to receive compensation for damages suffered in relation to violations of environmental law by third parties [ART. 39.II.].

6.1.2.2 The Inter-governmental and Host Government Agreement Framework

The SCP Project is being implemented within the framework of an Intergovernmental Agreement (IGA) between the Azerbaijan Republic and Georgia, and comprises a package of documents including the IGA itself and two unexecuted forms of the Host Government Agreements (HGAs). Together, the IGA document package constitutes the binding international law and the controlling domestic law of Azerbaijan governing the SCP Project.

The foregoing IGA document package was ratified by both Parliaments, and the instruments of ratification were exchanged in Baku between the Azerbaijan Republic and the Republic of Georgia on 4 February 2002. On 14 February 2002, the SCP Participants executed the HGA with the Azerbaijan Republic and subsequently the HGA with the Republic of Georgia. Table 6.1 depicts the Intergovernmental and Host Government Agreement Framework.

Table 6-1 IGA and HGA Agreement Framework Matrix

AGREEMENT	AZERBAIJAN	GEORGIA
IGA Signed and ratified by Governments together with unexecuted forms of the three HGAs, the LSTK and the Government Guarantee appended thereto	✓	✓
HGA Signed by Government and the SCP Participants as private law contracts.	✓	✓

6.1.2.3 The IGA

In an effort to ensure more uniform application of environmental, health, safety and technical standards across the two jurisdictions in which the SCP Project will be constructed and operated, Article IV of the IGA states that “[such standards will be] in accordance with international standards and practices within the Natural Gas pipeline industry (which standards and practices shall be set forth in the applicable Host Government Agreement) and such other requirements as set forth in the relevant Project Agreements, which shall apply notwithstanding any standards and practices otherwise applicable under the domestic law of the respective State” This more general statement is subsequently elaborated in the relevant provisions of the HGA as described below.

6.1.2.4 The HGA

In addition to its role as an integral component of the IGA, the HGA is also a contract entered into between the Government of Azerbaijan and the SCP Participants. The HGA determines the following components of the regulatory framework for the conduct of SCP Project Activities:

- The overall regulatory framework within which the SCP Project will be constructed and subsequently operated including the technical and design standards
- The applicable foreign and international environmental standards and practices incorporated by reference into the Azeri legal system by the HGA
- The regulatory requirements applicable to the SCP Project and the administrative responsibilities of different government departments for the SCP Project
- The liability of the SCP Participants to the State and to third parties for, inter alia, breaches of the national environmental legislation

Each of these components will be briefly summarised below.

The Overall Regulatory Framework

Article 12 and Appendix 4 of the HGA detail the environmental, health and safety standards and practices applicable to the project. The main principles of Article 12 include the following:

- The environmental, health and safety standards are set forth in Appendix 4 and are applicable notwithstanding conflicting national standards and practices (12.1)
- If a release of natural gas occurs, the SCP Participants will take all necessary action as set forth in Appendix 4 (12.1)
- The applicable social impact standards are set forth in Appendix 4 (12.2)

The following is a brief summary of the matters covered in Appendix 4 of the HGA:

- SCP Participants must act as prudent operator in identifying, harmonising and complying with environmental, health, safety and social standards (Preamble to Appendix 4)
- Order of priority for actions shall be protection of life, environment and property (Clause 3.1)
- Environmental standards to be conformed with (Clause 3.1)
- Procedures to be followed in the event of an emergency (Clause 3.2)

- Enactment or promulgation of future environmental standards and practices by regional or intergovernmental authorities shall not apply to the extent they are different from, in addition to, or more stringent than the Environmental Standards applicable as of the Effective Date (Clause 3.3)
- Scoping study and risk assessment requirements (Clause 3.4)
- Contaminated land baseline study requirements (Clause 3.5)
- Environmental Impact Assessment procedures and requirements (Clause 3.6)
- Emergency Response Plan procedures and requirements (Clause 3.7)
- General principles to be followed in the preparation of the scoping study, risk assessment, Baseline Study, EIA and Emergency Response Plan (collectively termed the “Environmental Strategy Product”) (Clauses 3.8 to 3.11)
- Procedures to be followed in the event of dispute as to the implementation of the Environmental Strategy Product (Clause 3.12)
- Liability for pre-existing environmental pollution, contamination or damage (Clause 3.13)
- Abandonment plan procedures and requirements (Clauses 4.1 to 4.3)

The general requirements described in Clauses 3.6 and 3.8 to 3.11 have formed the basis for the methodology and structure adopted in the environmental impact assessment for the project. For purposes of technical compliance, as well as for purposes of achieving compliance with the applicable environmental standards and practices, the HGA also sets forth the technical and design standards for the SCP Project.

Section 3.1 of Appendix 4 of the HGA is explicit in that the SCP Participants shall:

In conducting all activities involved in the [Pipeline Activities], the [SCP] Participants shall use Best Endeavours to minimise potential disturbances to the environment, including the surface, subsurface, sea, air, lakes, flora, fauna, other natural resources and property. The order of priority for actions shall be protection of life, environment and property.

HGA Environmental, Health and Safety Regulatory Process

The HGA also specifies that, *inter alia*, all environmental, health and safety approvals shall be provided on a priority basis within thirty (30) days but in no event later than sixty (60) days (subject to the provisions of Appendix 4). Appendix 4 of the HGA also details the regulatory requirements associated with the preparation, submission and publication of various components of the environmental strategy product including a scoping study, risk assessment, an environmental Baseline Study, the Environmental Impact Assessment and the Emergency Response Plan.

HGA Principles on Environmental and Other Liabilities

In addition to the obligation imposed on the SCP Participants by Article 12 of the HGA, Sections 10.1 and 10.2 further set forth the principles of liability applicable to the SCP Participants in the event of a breach by them of the national environmental legislation. The SCP Participants shall be liable to the State Authorities for loss or damage arising from any breach by them of the HGA or the national legislation of Azerbaijan. Moreover, the SCP Participants shall be liable to third parties for any breach of the standards set forth in the HGA or the national legislation; provided, however, that the SCP Participants shall not be liable to the State Authorities for punitive or consequential damages.

6.1.3 Existing National Legal & Administrative Framework - Environmental

Azerbaijan is divided into 78 administrative and territorial units (Districts) and the Nakhichevan Autonomous Republic. All central government bodies are located in Baku, the capital city. The principal administrative functions in each District are performed by Local Executive Bodies. A full description of the administrative structure is given in section 10, Socio-Economic Baseline.

A variety of government bodies share responsibility for environmental and social issues. The following organisations are particularly significant:

- Ministry of Environment and Natural Resources (MENR)
- State Committee on Land and Cartography
- State Labour Committee
- Health Ministry
- State Committee for Architecture and Construction
- Municipalities and the Local Executive Authorities

Until May 2001 the national environmental regulatory body of Azerbaijan was the Azerbaijan State Committee of Ecology (ASCE). The ASCE had interdepartmental status and was directly subordinate to the President of the Azerbaijan Republic. The ASCE has now been replaced by the MENR.

The MENR was recently formed from the merger of four state organisations comprising the ASCE, State Forestry Committee and the State Committee for Geology. The MENR is responsible for the following:

- Development of draft environmental legislation for submission to Supreme Soviet (Milli Mejlis)
- Implementation of environmental policy
- Enforcement of standards and requirements for environmental protection
- Suspension or termination of activities not meeting set standards
- Advising on environmental issues
- Expert review and approval of environmental documentation, including Environmental and Socio-economic Impact Assessment

Throughout this document, references are made to both of these regulatory bodies. This has been necessary, as many activities carried out in the early stages of the SCP project involved consultation with the ASCE. However, any future consultation will now be with the MENR.

Further guidance on the ESIA process in Azerbaijan is given in:

- 1999 (June 8) Law on Environmental Protection
- 1999 (August 4) Law on Ecological Safety
- 1996 ASCE/UNDP Handbook for the Environmental Impact Assessment Process in the Republic of Azerbaijan

The ESIA Process is applied to all development proposals in principle. The extent and depth to which the ESIA Process is applied is dependent upon the severity of the expected environmental impacts. This decision is made by the MENR, in consultation with appropriate

experts. After consultation with the MENR, the SCP Participants have agreed to undertake a full ESIA.

6.1.3.1 Protected Areas

The laws on Environmental Protection and Natural Areas and Objects of Special Protection include specific provisions concerning the status of Specially Protected Areas. Activities with a potential to have a negative impact upon the environment are not allowed in State Natural Reserves, National, Natural and Ecological Parks as well as the State Natural Forbidden Areas. With the exception of State Natural Reserves, which represent the highest protection category, operations that have no negative impact on the environment are allowed after approval by the MENR.

A network of Specially Protected Areas, with different levels of protection, has been established and now functions within the Republic of Azerbaijan. The Specially Protected Areas are grouped as follows:

- State Natural Reserves, including Biosphere Reserves
- National Parks
- Natural Parks
- Ecological Parks;
- State Natural Forbidden Areas (Wildlife Sanctuaries);
- Natural Monuments;
- Zoos;
- Botanical Gardens and Arboretums;
- Health Resorts; and
- Hunting Reserves.

A key objective in routeing the pipeline has been to avoid protected areas. The proximity of the pipeline to protected areas is described in Section 8.

There are also currently 14 areas within Azerbaijan that are protected due to their cultural importance. These Cultural Reserves fall under the jurisdiction of the Ministry of Culture. The SCP route crosses the very northern tip of the Gobustan Cultural Reserve, but away from any of the features for which the Reserve is designated. It was not possible to route the pipeline to avoid the Reserve due to significant terrain constraints to the north.

Protection, use, and restoration of Reserve Areas are carried out on the basis of the “Law On Protection of Historical and Cultural Monuments” and the “Law On Culture”, as well as on the basis of international conventions and recommendations [eg the Convention on Protection of World Cultural and Natural Heritage (Paris, 16.11.1972) and the European Convention on Protection of Archaeological Heritage (La Vilette, 16.01.1992)].

6.1.4 Other international agreements and conventions

A broad range of multilateral and regional agreements is relevant to the SCP Project and has been fully considered in the EIA and other environmental studies. Following the independence of Azerbaijan in 1991, the Azerbaijan State Committee for Ecology and Nature Resources Utilisation (ASCE) began to establish close contacts with international environmental organisations and various Government environmental departments.

The Azerbaijan Republic has ratified the following international environmental conventions:

- (1948) Universal Declaration of Human Rights
- The 7 core ILO Conventions¹
- 1971 Convention of Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention), 1982 Protocol and 1987 Amendment to the Convention
- 1972 Convention concerning Protection of the World Cultural and Natural Heritage;
- 1973 Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)
- 1979 Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)
- 1987 Montreal Protocol on Substances that Deplete the Ozone Layer
- 1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal
- 1991 Espoo Convention
- 1992 UNECE Conventions on the Protection and Use of Transboundary Watercourses and International Lakes
- 1992 Convention on Prevention of Marine Pollution
- 1992 Convention on Biodiversity
- 1992 United Nations Framework Convention on Climate Change
- 1994 Convention on Combating Desertification

In addition, Azerbaijan has acceded to the following conventions, which have not yet been ratified:

- 1951 International Convention for the Protection of Plants and Plant Products
- 1985 Vienna Convention on the Protection of the Ozone Layer
- 1998 Convention on Access to Information, to Public Participation in the Decisions Making Process and the Administration of Justice concerning Environmental Matters (Aarhus Convention)

6.1.5 International Finance Institution (IFIs) policies and guidelines

The SCP partners are required by the provisions of the HGA to "conform to the environmental standards and practices ... generally observed by the international community with respect to Petroleum pipeline projects comparable to the Project" (Article 3, HGA). Thus, to satisfy the HGA and to ensure good practice, all ESIA work for the SCP project is being carried out with regard to World Bank Group and European Bank for Reconstruction and Development (EBRD) policies.

The following table indicates the IFI policies that might be deemed applicable, and have been considered in developing this ESIA. Tables 6-2 to 6-4 indicate why the policies might be deemed of relevance; how they are being addressed by the project; and where they are discussed in the ESIA.

¹ Forced Labour (C29, 1970 & C105, 1957), Freedom of Association and Right to Organise (C87, 1948), Right to Organise & Collective Bargaining (C98, 1949), Discrimination (Employment & Occupation) C111, 1958, Equal Re-numeration (C100, 1951), Minimum Age (C138, 1973).

Table 6-2 IFC/World Bank Group and EBRD policies considered

Policy	Potential relevance to the SCP Project	Compliance by the SCP Project	ESIA Document Reference
OP4.01 Environmental Assessment (October 1998)	<p>Requirement for environmental assessment (EA) of projects proposed for financing.</p> <p>The SCP project would be classified as a Category “A” project for the purpose of environmental screening. Projects are classified as Category A if they could have “adverse impacts that may be sensitive, irreversible, and diverse” (OD4.01).</p> <p>The associated guidelines specify the stages of the EIA process, discuss their objectives and list requirements for each stage.; including screening, scoping and development of terms of reference, preparing environmental assessment report, EA review and project appraisal, and project implementation.</p> <p>EA for a Category A project examines the project's potential negative and positive environmental impacts, compares them with those of feasible alternatives and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.</p>	Through the development of this ESIA report.	
OP4.04 Natural Habitats (November 1998)	<p>OP4.04 embodies the “no net loss” principle, Paragraphs 4 and 5 state: “The IFC will not invest in projects that significantly convert or degrade critical natural habitats or in projects that otherwise affect habitats supporting threatened or endangered species. They will also not invest in projects that significantly convert or degrade other natural habitats</p>	The SCP project, and BP recognise the importance of protecting biological diversity, and in particular ensuring that protected natural habitats are avoided where at all possible through the route selection process. Where an overall project assessment indicates that this is unfeasible, and the overall benefits substantially outweigh the	See Section 8, Environmental Baseline, and Part 1 of Baseline Reports (Appendices) for a discussion of habitats and protected areas

Table 6-2 IFC/World Bank Group and EBRD policies considered

Policy	Potential relevance to the SCP Project	Compliance by the SCP Project	ESIA Document Reference
	<p>unless careful and comprehensive review and analysis indicate that:</p> <ol style="list-style-type: none"> 1, No feasible alternative exists for the project or it's siting; 2. The projects overall benefits substantially outweigh its environmental costs; 3. Project plans include mitigation measures acceptable to IFC; and 4. Project sponsors have the ability to implement necessary conservation and mitigation measures or the project includes plans that are acceptable for developing this capacity. 	<p>environmental costs, direct mitigation measures have been developed and will be implemented to minimise the impact. Where a residual impact remains, the project will implement compensation plans and environmental investment projects to offset this impact and ensure that there is no net loss to biological diversity.</p>	
<p>OPN11.03 Management of Cultural Property (September 1986)</p>	<p>The World Bank Group's general policy regarding cultural properties is to assist in their preservation, and to seek to avoid their elimination. OPN11.03 states that the Bank normally declines to finance projects that will significantly damage non-replicable cultural property "Cultural Property" is defined as "sites having archaeological, palaeontological, historical, religious and unique natural values". Along the SCP pipeline route areas and sites have been identified that are important from an archaeological or cultural perspective.</p>	<p>The project has gathered detailed cultural heritage and archaeological information through literature searches and consultation with national and international experts. Extensive non-intrusive integrated baseline surveys involving teams of national and international experts have been completed and sites of potential importance avoided where possible through route selection. Remote sensing tools, including aerial photographs have been used to identify potential sites. Intrusive Phase 2 surveys will be undertaken to define the extent of any potential sites prior to construction, enabling further avoidance measures to be taken. Pre-excavation of sites will take place if no alternative route can be identified, and the overall project benefits outweigh any costs.</p>	<p>See Section 8, Environmental Baseline, and Part 2 of Baseline Reports (Appendices) for a discussion of important cultural heritage features. A Cultural Heritage Management Plan is included in Part 2a of Baseline Reports (Appendices).</p>

Table 6-2 IFC/World Bank Group and EBRD policies considered

Policy	Potential relevance to the SCP Project	Compliance by the SCP Project	ESIA Document Reference
		<p>Direct site protection measures will be implemented during the construction phase. Archaeologists will be present to monitor any late finds during construction. Plans are being developed to manage, record and preserve finds. The Cultural Heritage Management Plans will be subject to regular review and revision to ensure that the Project Plans remain appropriate and effective.</p>	
<p>OD4.30 Involuntary Resettlement, (June 1990)</p>	<p>The principal World Bank instrument governing project impacts resulting from land expropriation is World Bank OD 4:30 <i>Involuntary Resettlement</i>². World Bank OD 4:30 <i>Involuntary Resettlement</i> is invoked where the involuntary taking of land results in people experiencing economic or physical displacement through one or more of the following circumstances: (i) relocation or loss of shelter; (ii) loss of assets or access to assets; (iii) loss of income sources or means of livelihood, whether or not the persons must move to another location; and, (iv) loss of access or restriction of access to communal resources and services. Projects entailing any of the foregoing impacts are required to prepare a Resettlement Action Plan.</p> <p>Through careful pipeline alignment and facilities siting, the SCP Azerbaijan project will minimize impacts on housing and the need to physically relocate households.</p> <p>The project will also involve impacts on land, productive</p>	<p>Project land acquisition and associated livelihood impacts will be addressed in accordance with international good practice as embodied in the policies and guidelines of the IFC/World Bank Group. Requirements contained in Azerbaijan legislation and the project HGA will also be complied with.</p> <p>The overarching goal of the SCP project is:</p> <p><i>To restore or enhance project affected peoples' living standards, income earning capacity and production to at least without-project levels</i></p> <p>In compliance with OD4.30, the SCP project is completing a Land Acquisition and Resettlement Action Plan (LARAP). This document is currently under preparation using international specialists experienced in World</p>	<p>See Section 11, Socio-economic Aspects, Impacts and Mitigation, of this ESIA for a discussion of the land acquisition process. This section outlines the principles that are being followed to address SCP project and expropriation and associated physical and economic impacts on land owners, users and occupiers in Azerbaijan, and outlines in more detail how the above key issues will be addressed and compliance achieved.</p> <p>A full Land Acquisition and Resettlement Action Plan is also being prepared for the</p>

^{2 2} There are presently two involuntary resettlement policies in force within the World Bank Group. On advice of the World Bank Group, the project has adopted OD 4:30.

Table 6-2 IFC/World Bank Group and EBRD policies considered

Policy	Potential relevance to the SCP Project	Compliance by the SCP Project	ESIA Document Reference
	<p>assets, and livelihood through (i) temporary use of land for construction purposes; (ii) permanent acquisition of land (or imposition of rights to construct and operate a pipeline under existing ownership) for the pipeline alignment and two permanent AGIs; and, (iii) imposition of restrictions on land use adjoining the pipeline. The project will impact privately owned land, municipal and state land, some of which is leased to private entities and individuals.</p>	<p>Bank Group Policies and national land procedures. The LARAP will be prepared through consultation with project-affected people and will be publicly disclosed.</p> <p>The LARAP will also address the following key issues:</p> <ul style="list-style-type: none"> Grievance mechanisms Valuation of land and compensation determination Liaison with communities Negotiations Documentation of land use and/or ownership Eligibility for compensation Land re-instatement Monitoring and evaluation 	<p>project.</p>
<p>Policy on Disclosure of Information (September 1998)</p>	<p>The World Bank Group requires consultation with project stakeholders including the potentially affected population, NGOs and other interested parties about the project's environmental and social aspects, and to take their views into account. The consultation should begin at an early stage of the project design. IFC's publication "Doing Better Business Through Effective Public Consultation and Disclosure – A Good Practice Guide" provides "step-by-step" practical guidance on how to prepare a constructive public consultation programme and effectively disclose information.</p> <p>Under the World Bank Group policies, the SCP project</p>	<p>A Public Consultation and Disclosure Plan (PCDP) has been prepared for the SCP project in accordance with the World Bank Group policies.</p> <p>Public Consultation and Disclosure of information have been carried out through the design stages of the SCP project and will continue throughout construction and operations.</p> <p>A scoping report was completed in consultation with NGOs, scientists, academic</p>	<p>The SCP project consultation process is discussed in more detail in Section 16, Consultations.</p> <p>The full Public Consultation and Disclosure Plan is provided in Part 8 of the Technical Appendix.</p>

Table 6-2 IFC/World Bank Group and EBRD policies considered

Policy	Potential relevance to the SCP Project	Compliance by the SCP Project	ESIA Document Reference
	must complete a Public Consultation and Disclosure Plan (PCDP).	institutions, regulators and other interested stakeholders the early engineering design phase. The report was disclosed and comments taken into consideration during the execution of the ESIA baselines studies and impact assessment. Consultation continued during the ESIA preparation. The draft ESIA's will be disclosed in accordance with the HGA and World Bank Group requirements.	
IFC Policy Statement on Child/Forced Labor (March 1998):	NOTE * Consideration of this policy is a requirement for all World Bank Group investments and does not pre-suppose that the Bank believes that the Project is involved in such practices.	The SCP Project or its contactors will not employ Child or Forced Labour. The Invitations to Tender and Contracts contain appropriate clauses to address this.	Employment issues are addressed in Section 11, Socio-economic Aspects, Impacts and Mitigation.

Table 6-3 IFC/World Bank Group and EBRD guidelines considered

Guideline	Potential relevance to the SCP Project	Compliance by the SCP Project	ESIA Document Reference
World Bank Guidelines for Oil and Gas Development (Onshore) (July 1998)	These Guidelines address onshore oil and gas exploration, drilling and production operations.	The SCP project has been designed taking into consideration these guidelines; in particular in the areas of air emissions, waste management and oil spill prevention.	See Section 6.1 and 6.2 of this ESIA report for a description of the application of IFI requirements. Section 5, Project Description, outlines the project design and how these standards have been

Table 6-3 IFC/World Bank Group and EBRD guidelines considered

Guideline	Potential relevance to the SCP Project	Compliance by the SCP Project	ESIA Document Reference
			<p>achieved.</p> <p>Section 10, Environmental Aspects, Impacts and Mitigation</p>

Table 6-4 IFC/World Bank Group and EBRD procedures considered

Procedure	Potential relevance to the SCP Project	Compliance by the SCP Project	ESIA Document Reference
<p>EBRD Environmental Procedures (1996)</p>	<p>EBRD Environmental Procedures (1996) detail the environmental appraisal process and standards required of projects sponsored by the Bank. An EIA is required for all Category "A" projects, as listed in Annex 4 of the procedures, including large diameter oil and gas pipelines.</p> <p>It is the responsibility of the project developer to commission and conduct the necessary environmental investigations to the satisfaction of the Bank.</p> <p>EBRD operations are structured to meet national and existing European (EU) environmental standards. Where EU standards do not exist, national, World Bank standards and international agreements apply where relevant. EBRD encourages developers to comply with good international practice and standards.</p> <p>EBRD believes that effective public consultation is a way of improving the quality of operations. The EBRD requires project sponsors to ensure that national requirements for public consultation in the country of operation be met and that these in turn meet the</p>	<p>The SCP partners have commissioned this ESIA which addresses the requirements of the EBRD's procedures.</p> <p>The Public Consultation and Disclosure Plan (PCDP) developed (discussed above) details the SCP project's consultation and disclosure programme.</p>	

Table 6-4 IFC/World Bank Group and EBRD procedures considered

Procedure	Potential relevance to the SCP Project	Compliance by the SCP Project	ESIA Document Reference
	procedures described in the “Banks Disclosure of Information Policy”. For Category “A” projects the EBRD requires the project sponsors to provide the affected public and interested NGOs with notification about the nature of the operation. The EIA and Executive Summary should be available to the public in the local language, in accordance with relevant national legislation and allow sufficient time for public comment.		

6.1.6 BP corporate policy

6.1.6.1 Policy

BP corporate policy focuses on five areas: ethical conduct; employees; relationships; health, safety and environment; and control and finance. They apply equally to all BP activities worldwide. BP policy commitments are the foundation on which its business is built and carried out.

BP's corporate policy states that long-term relationships founded on trust and mutual advantage are vital to BP's business success. BP's commitment is to create mutual advantage in all relationships so that others will always prefer to do business with BP. This will be done by:

- Understanding the needs and aspirations of individuals, customers, contractors, suppliers, partners, communities, governments and non-government organizations
- Conducting activities in ways that bring benefits to all those with whom relationships are held
- Fulfilling obligations as a responsible member of the societies in which the company operates
- Demonstrating respect for human dignity and the rights of individuals

BP is committed to working to build long-term relationships founded upon:

- High performance standards
- Delivering on promises
- Openness and flexibility
- Learning from others
- Mutual interdependence
- Sharing success

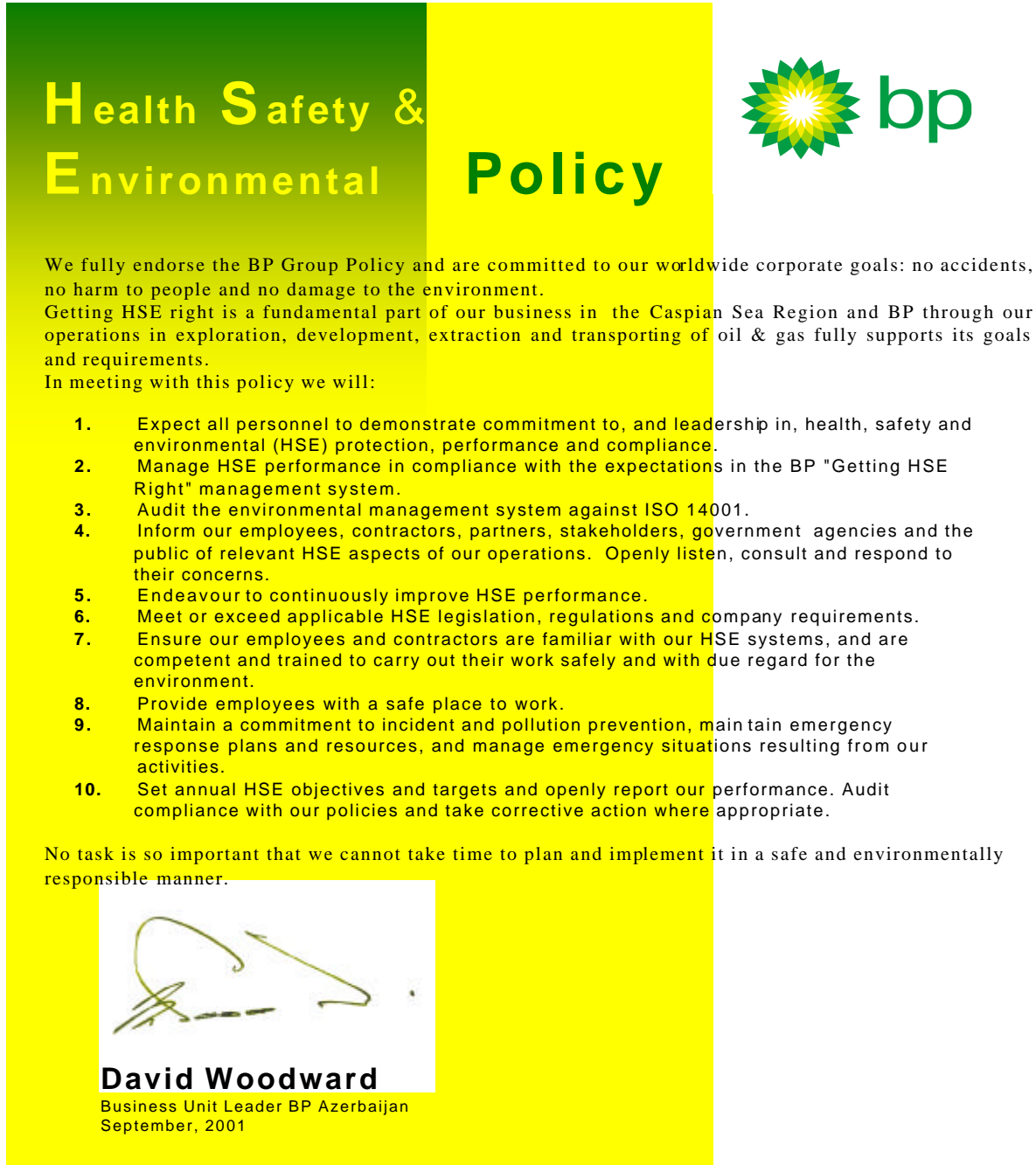
The SCP Partners have nominated BP HSE Policies as the basis on which the SCP Project is developed.

6.1.6.2 HSE Policy commitment


BP's commitment to HSE performance in the Caspian region, and applicable to the SCP project, is outlined in Figure 6-1 overleaf.

BP expects to apply its corporate policies above, and in particular on safety, health and the environment as long as it remains Operator of the project, and subject to the decisions made by Project Participants with respect to operation of the project. BP will apply these policies as in effect from time to time and the policies described in this ESIA are subject to change.

Figure 6-1 BP HSE Policy in the Caspian

The graphic features a vertical split background: green on the left and yellow on the right. The text 'Health Safety & Environmental Policy' is written in yellow on the green background and green on the yellow background. The BP logo is in the top right. The main text is in black on the yellow background, including a commitment statement, a list of 10 points, and a signature block for David Woodward.

Health Safety & Environmental Policy

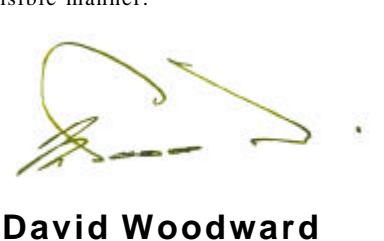


We fully endorse the BP Group Policy and are committed to our worldwide corporate goals: no accidents, no harm to people and no damage to the environment. Getting HSE right is a fundamental part of our business in the Caspian Sea Region and BP through our operations in exploration, development, extraction and transporting of oil & gas fully supports its goals and requirements.

In meeting with this policy we will:

1. Expect all personnel to demonstrate commitment to, and leadership in, health, safety and environmental (HSE) protection, performance and compliance.
2. Manage HSE performance in compliance with the expectations in the BP "Getting HSE Right" management system.
3. Audit the environmental management system against ISO 14001.
4. Inform our employees, contractors, partners, stakeholders, government agencies and the public of relevant HSE aspects of our operations. Openly listen, consult and respond to their concerns.
5. Endeavour to continuously improve HSE performance.
6. Meet or exceed applicable HSE legislation, regulations and company requirements.
7. Ensure our employees and contractors are familiar with our HSE systems, and are competent and trained to carry out their work safely and with due regard for the environment.
8. Provide employees with a safe place to work.
9. Maintain a commitment to incident and pollution prevention, maintain emergency response plans and resources, and manage emergency situations resulting from our activities.
10. Set annual HSE objectives and targets and openly report our performance. Audit compliance with our policies and take corrective action where appropriate.

No task is so important that we cannot take time to plan and implement it in a safe and environmentally responsible manner.



David Woodward
Business Unit Leader BP Azerbaijan
September, 2001

6.1.6.3 HSE Management

BP manages HSE through the application of a set of Corporate HSE Elements and Expectations embodied in the BP document “*Getting HSE Right*” or GHSER. All aspects of environmental management are addressed including the requirements for risk assessment; environmental impact assessment; emergency preparedness and response; community relations, and reporting and disclosure of information.

The policy expectations under the BP HSE Management System Framework state that, in all activities and operations, BP will:

- Comply fully with all legal requirements and meet or exceed our HSE Expectations wherever we operate in the world
- Provide a secure working environment by protecting ourselves, our assets and our operations against risk of injury, loss or damage resulting from criminal or hostile acts
- Ensure that all BP employees, contractors and others are well informed, well trained, engaged in and committed to the HSE improvement process; we recognize that safe operations depend not only on technically sound plant and equipment but also on competent people and an active HSE culture, and that no activity is so important that it cannot be done safely
- Regularly provide assurance that the processes in place are working effectively; while all BP employees and contractors are responsible for HSE performance, line management is accountable for understanding and managing HSE risks
- Fully participate in hazard identification and risk assessments, Assurance Management System Assessments and reporting of HSE results
- Maintain public confidence in the integrity of our operations; we will openly report our performance and consult with people outside the company to improve our understanding of external and internal HSE issues associated with our operations
- Expect that all parties working on BP's behalf recognize that they can impact our operations and reputation, and must operate to our standards. We will assure ourselves that our contractors' and others' management systems are compatible with our Commitment to HSE Performance

6.1.6.4 Environmental performance guidelines

Furthermore, BP has developed a set of environmental guidelines applicable to the development of new projects. The BP “*Upstream Environmental Performance Guidelines for New Projects and Developments*” apply to all new developments and major modifications undertaken by BP, including SCP project. They link the environmental assurance process with the engineering, commercial and business development processes. The guidelines require projects to use a zero damage philosophy as the starting point for project design and development. Any variations away from this basis must be evaluated against the following criteria:

- Technical feasibility
- Safety
- Legal Compliance
- Good Engineering Practice
- Environmental Damage Costs
- Expert Professional Judgment
- Remediation & Mitigation Options
- Reputation

The Environmental Performance Guidelines require the establishment of a set of project environmental goals, based on the concept of zero damage. These goals serve as the aspirational drivers for the project. Targets are set in line with these goals against which the environmental performance of the project design and implementation are measured.

The environmental goals established for the SCP project are:

- No combustion emissions
- No loading and offloading emissions
- Zero discharge to land or surface waters (eg oil, chemicals, wastes)
- Maximise efficiency of net energy exported
- Restoration of habitat and hydrogeological regime after construction of pipeline
- No permanent disruption to livelihood of local population
- No resettlement of inhabitants of local population
- No loss of containment of product
- No third-party damage to the pipeline
- No damage to protected ecological areas or archaeological sites
- No creation of access routes to otherwise inaccessible areas

6.1.6.5 Corporate focus areas

BP has three publicly stated corporate environmental focus areas:

- Biodiversity
- Green House Gas Emissions Reduction
- ISO 14001 Environmental Management System Accreditation

Biodiversity

The SCP project recognises that it has the potential to have real and measurable impacts on biodiversity, both positive and negative as reflected by the Project Environmental Goals.

In his speech in 2000 at the BP Conservation Awards ceremony, Lord John Browne formalised BP's ongoing practical commitment to biodiversity through making specific external commitments to take action on biodiversity issues:

“We can have a real, measurable and positive impact on the biodiversity of the world. That is a high aspiration - but like our other aspirations we're determined to show that we can deliver.”

And that BP were committed to achieve this by:

- *“Working to understand the impact of our current activities....*
- *Ensuring that key staff monitor and manage conservation and biodiversity issues in their area of responsibility - as part of their performance contracts....*
- *Expanding the area we manage for conservation....*
- *Integrating biodiversity considerations into our operating practices....*
- *Working with others - local communities, partners and contractors - so that our effort is part of a wider drive in the right direction....*
- *Undertaking a series of specific initiatives in the countries and areas where we Operate....*
- *Measuring, reporting and auditing performance....*

- *Setting targets to drive the right behaviours, publish results and have them independently verified....*
- *Sharing our ecological data with the World Conservation Monitoring Centre (WCMC)''*

BP has a strategy in place that sets out 5 elements for action:

- Responsible Operations - understand impacts on biodiversity and demonstrate continual improvement in performance
- Public Policy - contribute constructively to the public policy on biodiversity
- External Relations - understand what is important to people; forming partnerships to develop solutions to biodiversity issues
- Conservation Projects - create collaborative partnerships, fund and contribute to conservation activities aligned with local, national, regional and global priorities
- Research, Education and Awareness - make a positive contribution to biodiversity research and education; raise awareness and understanding of employees, people BP works with and customers

At the SCP project implementation level, the BP Corporate Biodiversity Strategy is translated into:

- The need to comply with the commitments and spirit of International Treaties and Conventions to which Azerbaijan, Georgia and Turkey are signatories
- Integration of project plans with national and regional biodiversity action plans
- A robust route selection process including evaluation of biodiversity impact, resulting in the pipeline construction corridor that avoids the most sensitive areas, including IUCN Category I to IV sites
- An open and thorough public consultation process to identify sensitive areas, possible mitigation measures and achieve buy in and consensus on solutions
- Development of direct mitigation measures such as re-routes; reduced working width; seasonal constraints etc
- Incorporation of direct mitigation measures into pipeline construction Invitation to Tender (ITT) documents
- Evaluation of possible indirect mitigation measures, such as offset projects resulting in overall enhanced biodiversity or environmental additionality
- Identification of potential partners for implementation of offset projects
- Provision of baseline data to the World Conservation Monitoring Centre (WCMC) to enhance its worldwide ecological database, thus assisting with biodiversity planning

Greenhouse gas emissions reduction

BP is committed to maintaining brand distinction compared to market competitors through continued leadership on greenhouse gas (GHG) emissions reductions. To achieve this BP will look to continue to influence public policy on climate change. BP is well positioned to take advantage of the growing market for lower carbon energy and to build on value already created through energy savings, which have resulted from earlier initiatives. It is recognised that Carbon has already become, and will increase in importance as a real business issue / cost.

BP supports the view of the Intergovernmental Panel on Climate Change that:

- The global average surface temperature has increased during the 20th century by about 0.6°C
- About three-quarters of the anthropogenic emissions of CO₂ to the atmosphere during the past 20 years is due to fossil fuel burning

- There is now new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities
- Future changes in atmospheric composition and climate are inevitable with increases in temperature and some extreme events, and regional increases and decreases in precipitation, leading to an increased risks of floods and droughts

In 1998, BP targeted a 10% reduction in internal GHG emissions from a 1990 baseline (90MT) by 2010. This target was achieved in 2001 with emissions of 80.5MT (9.5MT reduction). However, meeting the target is not the end of BP's commitment to tackling climate change.

Therefore BP has identified a number of further steps to address the climate change issue. These recognise the need for stabilisation of GHGs in the atmosphere, and include:

- Improved energy efficiency
- Use of lower carbon fuels
- CO₂ capture and storage in the medium term

Through application of skills, technology and business processes BP has set an internal target to hold our net emissions at 10% below 1990, through 2012, by a combination of:

- 10 – 15% improvement in operational energy efficiency by 2012
- Use of flexible mechanisms such as GHG emissions trading and carbon credits

This will be achieved by:

- Sharing knowledge and expertise on energy efficiency
- Producing and selling products with a lower carbon content
- Shifting the balance of our business in favour of lower carbon energy sources
- Working with others (eg Auto makers) to develop more energy efficient technologies
- Continuing our focus on growing our renewable energy portfolio

BP has established a pioneering internal emissions trading scheme, which will be used to help meet GHG emissions targets. Through making and selling lower carbon products, BP will be helping to create "carbon credits", which can be created when a change is made to a more efficient or lower carbon form of energy. BP is committed to working with others to advance emissions trading and emissions credits. We will work with others to quantify credits and apportion ownership.

BP is continuing to lead in the commercialisation of renewable energy technologies, and has one of the fastest growing renewable energy businesses in the world, BP Solar for example is expected to grow by 40% this year.

At the SCP project implementation level, the BP Corporate commitment to GHG emissions reduction is reflected in the developing emissions profile for the project.

ISO 14001 accreditation

To progress towards the BP Environmental Expectation that material activities and operations be managed in line with a recognised international Environmental Management System (EMS), specifically ISO 14001, the following target was established:

- By the end of 2001 (2002 for Arco heritage) all major facilities will have their EMSs certified to ISO 14001, and be producing regular verified site environment reports, available on the Internet

The BP Caspian Sea Business Unit achieved certification of its EMS in the year 2000, covering all existing operational units.

At the SCP project implementation level, the BP Corporate commitment to ISO 14001 certification is reflected in the requirement to achieve certification within 9 months of operations commencing. To aid this certification process this ESIA has been developed to be in line with the requirements of ISO 14001, including development of registers of legislation, aspects and impacts registers and monitoring and management plans. An EMS will be developed to manage activities during the construction phase, with certification to be achieved within 9 months of operations commencing.

6.2 SOCIAL LEGISLATION AND POLICY FRAMEWORK

6.2.1 Introduction

As with the environmental requirements, the social requirements set forth in the IGA and the HGA override national legislation to the extent such national legislation is inconsistent. Therefore, the SCP Project social legislation and regulatory framework in Azerbaijan includes not only what is set forth in the IGA and HGA, but also includes Azerbaijan national legislation to the extent that it is not inconsistent with the IGA and HGA. Additionally, the SCP Project will be implemented in accordance with applicable international conventions in force in Azerbaijan, IFI standards with which SCP agrees to comply as part of the SCP Project financing and BP project specific policies, which in many instances exceed the above mentioned legal requirements.

The descriptions of the IGA, HGA and other laws and documents included below are summaries only and are qualified by reference to the full text of the actual laws or documents.

6.2.2 Host Government Agreement (HGA)

Many of the requirements applicable to social assessment are set out in Article 12 of the Azerbaijan HGA. Article 12 references Appendix 4, which outlines the standards and principles for social impact assessment (SIA). The key requirements are:

- Use best endeavours to minimise potential disturbances to surrounding communities and the property of the inhabitants thereof (Clause 46.1 of Appendix 4)
- Complete a general review of social conditions in the general location of the pipeline and associated infrastructure, consisting of a scoping study and a risk assessment. These will together form the basis of the content and structure for a social impact assessment of SCP activities and associated operations, to be conducted by the SCP Participants (Clause 46.3 of Appendix 4)

In addition to Article 12 and Appendix 4, Article 4.1 references Appendix 2, which further governs the social impact of the SCP Project. The key aspect is discussed below:

- The right to receive confirmation that each affected landowner and/or occupier has been made aware of and has consented and/or has been compensated under Azerbaijan Law

Finally, Article 18 of the Azerbaijan HGA details certain employment and procurement practices. The key aspects include:

- The SCP Participants and any contractor may select and determine the number of employees to be hired in connection with the project. All citizens of the State hired in respect of the project shall be hired under written employment contracts that specify the hours of work required of the employees and the compensation and benefits to be paid. All employment practices applicable to citizens of Azerbaijan working on the project in Azerbaijan must not be less beneficial than the requirements provided for in Azerbaijan labour legislation, subject to the condition that no Project Participant shall be required to follow any employment practices or standards that (i) exceed those international labour standards or practices which are customary in international Natural Gas transportation projects or (ii) are contrary to the goal of promoting an efficient and motivated workforce. These requirements include hours of work, leave, remuneration, fringe benefits and occupational health and safety standards (Section 18.2)
- For procurement of services, equipment, materials, machinery and tools, vehicles, spare parts, goods and supplies necessary for the proper conduct and achievement of SCP Activities, the SCP Participants and any Contractor (including any Operating Company) shall give preference to Azerbaijan suppliers in those cases in which such Azerbaijan suppliers are in all material respects competitive in price, quality and availability with those available from other sources (Section 18.3)

6.2.3 Existing National Legal and Administrative Framework

Various Government Bodies share responsibility for most social issues, with the following groups playing a more pertinent role:

- State Committee on Land and Cartography
- State Labour Inspection
- Health Ministry
- Ministry for Ecology and Natural Resources
- State Committee for Architecture and Construction
- Municipalities and the Local Executive Authorities

6.2.3.1 Land legislation

The overall framework for the granting of Rights to Land by the Government to the SCP Participants is set forth in Articles 4 and 7 and Appendix 2 of the HGA. Section 4.1 of the HGA grants to the SCP Participants:

- The absolute and unrestricted right to carry out the Project and conduct SCP Activities
- The exclusive and unrestricted Rights to Land as set forth in Appendix 2
- The exclusive right to use, possess, control and construct upon and/or under the Permanent Land

Section 7.2 of the HGA grants the SCP Participants the right to exercise the above mentioned Rights to Land by providing that the State Authorities shall:

- Exercise powers of taking, compulsory acquisition, eminent domain or other similar sovereign powers to allow the SCP Participants to receive and exercise the Right to Land in respect of the State Land

- Pay such compensation to Persons in the Territory as may be required by Azerbaijan Law to authorise the State Authorities to grant to and vest in each of the SCP Participants the rights obtained in accordance with the previous bullet point. Any such Non-State Land acquired shall be subject to the obligations that such Land be acquired at the lowest possible cost in accordance with the standards and procedures set forth in the Land Code of the Azerbaijan Republic, the Law of Azerbaijan Republic on Land Market and any Decrees of the President and/or the Cabinet of Ministers implementing such laws. In addition, the SCP Participants shall pay the State Authorities the amount of all verifiable costs to be incurred by State Authorities

Appendix 2, which is appended to the HGA by Section 4.1(iii), further governs the SCP Participants Rights to Land by providing that:

- The Rights to Land granted to or obtained by the SCP Participants shall be enforceable by the SCP Participants against all State Authorities and against all third parties
- The State Authorities will obtain, secure and grant to the SCP Participants, among other things, the following Rights to Land:
 - (1) The right to transport construction materials, plant and equipment without hindrance, including the right to construct and maintain roads
 - (2) Right to use and designate other areas of land
 - (3) Right to receive confirmation that each affected landowner and/or occupier has been made aware of and has consented to and/or has been compensated under Azerbaijan Law for the rights acquired by the SCP Participants through State Authorities
 - (4) Right to exclusive use, possession and control, and the right to construct upon and/or under, and peaceful enjoyment of, these Rights to Land without hindrance or interruption

6.2.3.2 Public participation & consultation

In line with BP policies, public participation is expected to form a key role in the development of projects such as SCP. Public participation is linked with BP's commitment to sustainable development. To remain aligned with World Bank funding requirements, public participation is expected to be an integral part of the project. The 1993 document Public Involvement in Environmental Assessment: Requirements, Opportunities and Issues, in Environmental Assessment Sourcebook Update 5, lists the various forms of consultation that are recommended in the development of an EIA. Parties specifically requiring consultation would include the public and non governmental organisations. Consultation should be complete before construction begins.

In addition to World Bank requirements, the EBRD requires that project sponsors carry out monitoring to ensure that national requirements for public consultation be met and that the procedures described in the Banks Disclosure of Information Policy are adhered to.

The EIA "Handbook" contains provisions requiring the developer to inform the public about a proposed development and to utilise the ESIA process as an effective two-way feedback system, with the ultimate aim of providing an opportunity for the public to provide input to the decision-making process.

Environmental Assessment in Azerbaijan is based upon the 1996 UNDP guidelines, which include requirements and systems for consulting the public. Although the guidelines are adopted

in practice, they have no formal status in law, as they have not been through the procedure of Milli Mejlis (Parliament).

Present requirements have evolved through the system of Ecological Expertise. This is addressed under articles 50 and 58 of the 1999 Environmental Protection Act. Article 50 states that “Expertise is conducted by the relevant body of executive power and public organisations,” while other articles focus on the role of the state and the power in law of the Expertise decision. Article 58 provides for independent involvement in the process. The Act also states that citizens have the right to participate in discussion of issues related to projects which may have a harmful impact on the environment.

The State Environmental Expertise authorities regulate compliance with the requirement for public participation.

Azerbaijan is also a signatory to the 1998 UN Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters.

6.2.3.3 Labour legislation

The Constitution, international conventions and the Labour Code of Azerbaijan, 1st February 1999 regulate labour relations of all workers and employees in the Republic of Azerbaijan. This sets out the principles and procedures ensuring the rights to employment rest and work under safety and health conditions and to other basic rights and freedoms as stipulated in the Constitution of the Republic of Azerbaijan. Public control over the provision of labour, social and economic rights of employees and employers, is governed by trade unions and representatives of employers’ unions (Article 309 of the Labour Code).

Monitoring, implementation, and enforcement of these laws belong to the Office of the Public Prosecutor and also the State Office for Labour Inspection (Article 308 of the Labour Code). The latter operates under the regulation passed by Resolution No 20 on 9th February 2000.

Under the Law on the Legal Status of Foreign Citizens and Stateless Persons (1996) and the Law on Labor Migration (1999), foreign citizens and stateless persons have the right to work for a definite period in the Republic of Azerbaijan if certain legislative features are followed. These include registration with the relevant local authorities of the location of the foreign employee’s residence as well as obtaining permission for employment.

The HGA provides Project Participants with the right to employ such Persons (including foreign citizens) who, in the opinion of such Project Participant, demonstrate the requisite knowledge “subject only to the enforcement of immigration (including visa and residence permit regulations), customs, criminal and other relevant laws related to ingress and egress” (s. 7.2).

Under the HGA, Project Participants shall not be required to follow any employment practices or standards that (i) exceed those international labour standards or practices which are customary in international Natural Gas transportation projects or (ii) are contrary to the goal of promoting an efficient and motivated workforce.

The Azerbaijan Republic is a party to a broad range of multilateral and regional agreements in relation to regulation labour rights, including a large number of International Labour Organisation Conventions.

6.2.4 Other international agreements and conventions

The key international agreements and conventions of relevance to social issues are outlined in Section 6.1.2 above.

6.2.5 International Finance Institution (IFIs) policies and guidelines

The key international finance institution policies and guidelines of relevance to social issues are outlined in Section 6.1.5 above.

6.2.6 BP Corporate social policies

Relevant BP corporate social policies will be applied to the project. These are outlined in full in the BP booklet, “What We Stand For”. Contractors will be required to comply with these policies, and appropriate clauses are included in the Invitations to Tender and Contracts. Key aspects of BP Business Policies on social issues are highlighted below. BP will also apply the project Statement of Social Objectives, as set out in Table 6-5 below.

Table 6-5 SCP Statement of Social Objectives

The SCP Project is committed to delivering mutual benefits to communities along the pipeline route and to establishing long-term relationships with these communities, during both the construction and operational phases. We will:

- Minimise potential negative social impacts through identification and mitigation, in particular via a social impact assessment
- Publish regular updates on the environmental and social aspects of the project, and conduct regular dialogue with interested organisations
- Maintain regular contact with communities along the pipeline route through a team of Community Liaison Officers prior to, during and following the construction period
- Compensate for damage to land and property in a legal, transparent and ethical manner that respects the interests of those involved
- Manage expectations on employment opportunities, by providing information on the level and duration of employment requirements
- Seek opportunities to increase employment of country nationals, and in particular those in villages along the pipeline route, subject to availability of appropriate skills
- Establish recruitment procedures that are transparent, public and open to all regardless of ethnicity, religion, or gender
- Provide periodic training to enhance the skills and capacity of both employees and contractors
- Draw up procedures and management plans for all construction camps, in relation to contacts with local communities
- Provide periodic training on liaison with local communities to all staff employed by the SCP project and contractors
- Establish a community investment programme that delivers mutual benefits to the BP and communities along the pipeline route
- Seek opportunities for communities to mutually benefit from the activities undertaken, and infrastructure required, by the project.

The following extracts from the BP booklet “What We Stand For” are of particular relevance:

6.2.6.1 Ethical conduct

“We will pursue our business with integrity, respecting the different cultures and the dignity and rights of individuals in all the countries where we operate. BP supports the belief that human rights are universal. They are enshrined in the United Nations Declaration of Human Rights (UNDHR), which we support”.

6.2.6.2 Employees

“We respect the rights and dignity of all employees. Everyone who works for BP contributes to our success and to creating a distinctive company. Working together, drawing from our diverse talents and perspectives, we will stimulate new and creative opportunities for our business. Collectively we will generate a more exciting and rewarding environment for work in which every individual feels responsible for the performance and reputation of our company”.

6.2.6.3 Relationships

“We believe that long-term relationships founded on trust and mutual advantage are vital to BP’s business success. Our commitment is to create mutual advantage in all our relationships so that others will always prefer to do business with BP”.

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT METHODOLOGY

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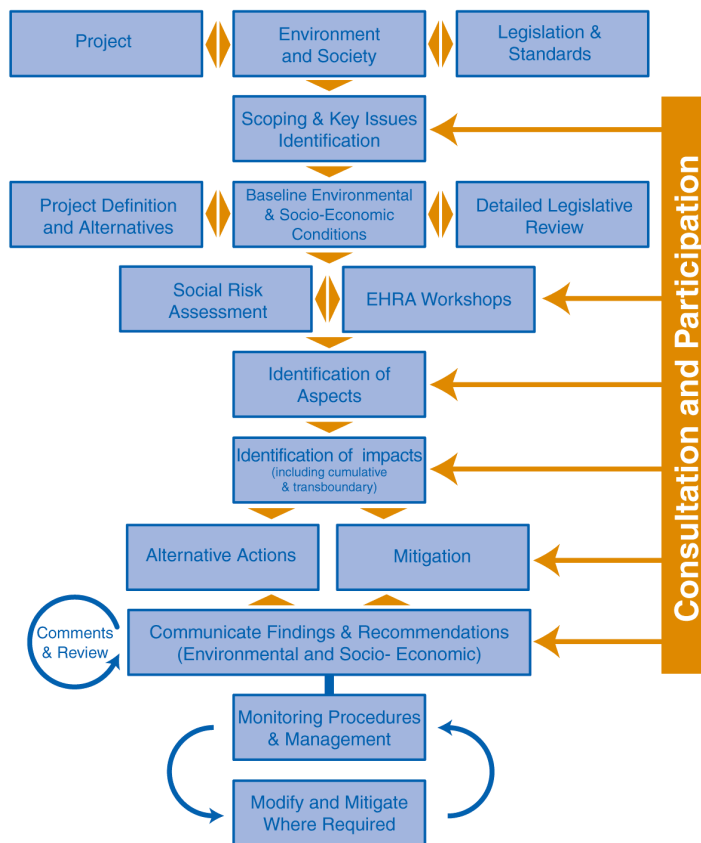
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7. ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT METHODOLOGY

7.1 INTRODUCTION

The Environmental and Social Impact Assessment (ESIA) process incorporates a number of key steps as illustrated in Figure 7-1. The assessment process constitutes a systematic approach to the evaluation of the proposed project in the context of the natural, regulatory and socio-economic environments in which development is proposed.

Figure 7-1 The ESIA process



Each of the steps in the ESIA process will be described in turn in the following sections. However key to understanding the process applied to minimizing the impact of this project has been the development of mitigation measures. All of the potential impacts arising from this project have been identified and subjected to either standard recognized best practice mitigation measures or to impact specific, feasible and cost effective mitigation. Any impacts that remain after the application of mitigation measures are considered residual impacts. Figure 7-3 (Section 7-10) illustrates the process of addressing potential impacts, mitigation and

residual impacts.

All residual environmental impacts are assigned a level of impact of Low, Medium or High, following the methodology described in Section 7.10. High and Medium level environmental residual impacts are considered for compensation including offset mitigation measures. Residual social impacts, are designated High, Medium, Low or Beneficial. All levels of impact are considered for compensation including additional offset measures such as community investment since those that are considered low for a community may still have a high impact on individuals making the classification more complex. All High, Medium, and Beneficial residual impacts are discussed further in Section 12.

7.2 CONSULTATION, PARTICIPATION AND DISCLOSURE

7.2.1 Overview

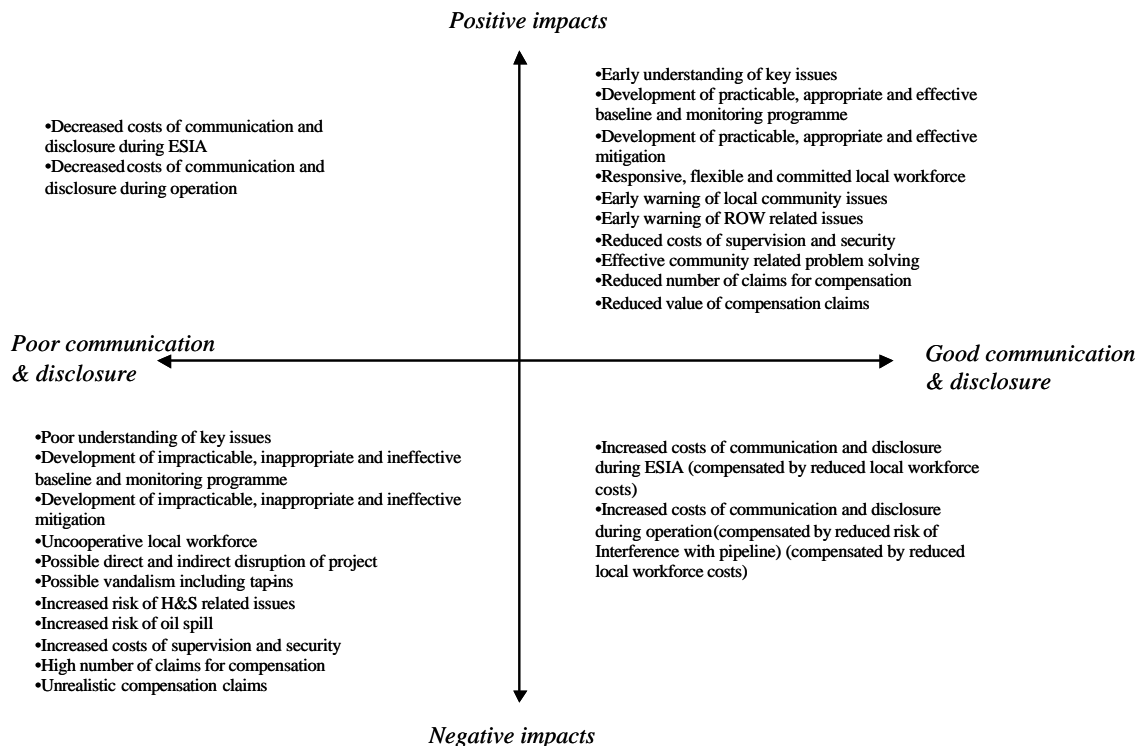
The process of stakeholder consultation and disclosure is an ongoing overarching requirement that applies to the entire ESIA process. Consultation is of critical importance in gaining insights into the key environmental and social issues, concerns of communities and other stakeholders, and in aiding the development of potential strategies for addressing project impacts. The SCP Partners recognize the importance of stakeholder consultation, participation and disclosure during the lifetime of the SCP project.

Effective consultation with stakeholders is:

- Key to understanding the concerns and requirements of affected communities and ensuring their participation in the formulation and refinement of the project design
- Effective disclosure, through the release of timely, accurate and comprehensive information to stakeholders. This is essential to ensure that the likely impacts (both positive and negative) are understood by stakeholders, and that they can provide feedback to the project

The benefits of effective consultation, participation and disclosure are illustrated in Figure 7-2.

Figure 7-2 Benefits of effective consultation and disclosure



Methodologies for disclosure and consultation are discussed in more detail in the following sections:

- Section 16, Consultations provides a full outline of the consultations which have taken place to date
- Part 5 of Technical Appendices, the Public Consultation and Disclosure Plan (PCDP), includes further information on the methodology used for data collection, consultation and lists of stakeholders consulted at each point
- Section 9, Socio-economic Baseline, outlines many of the social and economic issues raised by stakeholders during the consultation process

The consultation and disclosure process is both comprehensive and complex and care has been taken to capture and document stakeholder concerns.

7.2.2 Stakeholder identification

BP and the local and international ESIA consultants worked together to identify the key stakeholders who should be consulted with at various stages of the project. This was done using a combination of previous project experience, knowledge of Azerbaijan and the NGO community, and consultation with authorities, NGOs, academics, etc. This has ensured that all the people who may be affected by or have an interest in the proposed project have had an opportunity to obtain information about the project and to express their opinions and concerns.

Stakeholders were drawn from the following groups:

- **Authorities** comprising national, regional and local government bodies, of primary political importance to the project and to the ESIA process
- **International, National and local NGOs**, are organizations which have a direct interest in the project, and which may have useful data or insight into the local and national challenges faced by the project
- **Interest groups** include for example, media, academics, institutions, foundations and community groups
- **Residents, landowners and land users** of the towns and villages in what are known as the pipeline affected communities, those within a 2km corridor either side of the pipeline or pipe yard, or within 5km of a construction camp or large AGI
- **International Finance Institutions**, including the IFC and EBRD
- **SCP Owners and other project partners**

A full list of the stakeholders consulted can be found in the PCDP.

7.2.3 Tracking consultation

Documentation of public consultation is important in ensuring that inputs are captured and fed into the project planning process and to maintain a record of issues raised by consultees. A database was established to log all meetings with stakeholders at national, regional and local levels to ensure effective tracking of the consultation process throughout the ESIA and later the land acquisition process. This contains the dates of the meetings, minutes, issues raised, persons involved and agreed actions and responsibilities including:

- Records of meetings with government departments, scientists and conservancy bodies
- Records of meetings with local communities
- Records of meetings with NGOs

It was decided that data relating to consultation with individual households should be recorded separately to protect the anonymity of individual respondents. This is in line with international practice and helps to ensure that responses are truthful and more accurately reflect the opinions of the householders. The database is also used as a tool to ensure that actions are followed up and completed. A clear outline of the results of consultations carried out is presented in Section 16, Consultations.

7.3 THE SCOPING PHASE

Having decided that an ESIA was required for the SCP project, a Scoping Process was undertaken to identify key issues and develop the terms of reference for the ESIA. At this stage, it was considered essential to identify the likely environmental and social impacts and to define the project's area of influence. As part of this process, information about the project and its likely effects was disseminated to local affected communities, national scientists, academic institutions, and NGOs, in addition to the authorities and regulatory bodies. This was followed by consultations with representatives of these groups. The main purpose of these consultations was to focus the ESIA on issues of concern at the local level. The scoping led to a focused ESIA for a manageable number of important issues.

It was important for the successful completion of the ESIA that the scoping process was

undertaken early and in an open manner involving appropriate disclosure and consultation with relevant stakeholders.

7.3.1 Objectives

The objectives of the scoping phase were to:

- Define the project in sufficient detail to allow the Scoping exercise to effectively and efficiently shape the environmental and social impact assessment
- Review relevant policy, legal and administrative frameworks including corporate environmental policy and management system, relevant national and international legislation and guidelines
- Identify key issues
- Identify and confirm the stakeholders
- Initiate disclosure and consultation with the stakeholders, identify and document their key concerns and obtain their agreement on the key issues to be addressed
- Identify data gaps and agree with stakeholders any necessary fieldwork to fill these gaps
- Where appropriate, to identify potential mitigation measures for further analysis
- Establish the work plan and Terms of Reference for the remainder of the ESIA process, including a continuing programme of stakeholder disclosure and consultation.

7.3.2 Scoping workshops and report

A series of scoping workshops were held with the following key stakeholders in Azerbaijan:

- Local Communities
- National Regulators (Azerbaijan State Committee on Ecology (ASCE), now replaced by the Ministry of Ecology and Natural Resources (MENR))
- Scientists and academics from Institutes and Universities in Azerbaijan
- Regional and National Government
- BP Research and Monitoring Group
- NGOs
- IFIs

The workshops set out to inform key stakeholders on the project scope, the ESIA activities, and the schedule. They also solicited feedback on key issues to be addressed during the on-going consultation process.

A Scoping Report was produced summarizing the results of this initial phase and was made available to the following organizations:

- Azerbaijan Government
- The BP Monitoring and Research Group
- Key external stakeholders, eg the World Bank Group, EBRD
- BP and other partners of the SCP Co
- The engineering design teams (Kvaerner (now John Brown Hydrocarbons), Bechtel, Fluor Daniel and Brown & Root)

7.4 CONSIDERATION OF PROJECT ALTERNATIVES

Prior to agreeing the pipeline route and other aspects of project design, viable alternatives were identified so that a realistic base-case design could be developed. However, design development is an iterative process and the design is modified continuously to take account of new information as and when it has become available, including information from the ESIA process.

A full discussion of the alternative options that were assessed during the scoping and project development are discussed in detail in Section 4, including the social and environmental implications of a 'no development option'.

7.5 DETAILED LEGISLATIVE REVIEW

The Legislation and Policy Framework review for this project is described in Section 6. This review addressed social and environmental policies and requirements at the following levels:

- Host Government Agreement
- National Legislation
- International legislation and guidelines relevant to the project
- BP corporate policy and management systems
- Archaeology and Cultural Heritage
- Biodiversity and Sensitive Areas
- Social Regulations

The definition of relevant national and international standards and requirements has ensured that the project development has been assessed against all relevant existing environmental and social regulations and guidelines as well as the project proponent company's environmental, social, ethical and business policies and standards.

7.6 ESTABLISHING BASELINE INFORMATION

The Scoping report identified a number of key issues and associated information gaps. In order to understand the potential impacts of the proposed pipeline with respect to these issues, it is necessary to have a good understanding of the pre-project, or baseline, conditions. The key issues relate to a range of environmental and socio-economic attributes including:

- Noise
- Air quality
- Traffic
- Ecology
- Soils
- Cultural heritage
- Contamination of land
- Landscape
- Water resources
- Employment
- Energy

- Land acquisition
- Infrastructure and resources
- Safety
- Community relations

A good understanding of the baseline for these attributes has been achieved through two activities:

- Detailed review of all secondary resources (ie existing documentation and literature)
- Undertaking primary (baseline) field studies to collect necessary supplementary data

7.6.1 Environmental baseline information

The EIA consultants AETC, used a combination of local scientists and western experts to conduct detailed environmental baseline studies of a 100m corridor centered on the SCP route, and areas identified as being potential sites for construction camps, pipe yards and AGIs. Sensitive receptors and pathways to oil spill were also identified but over a wider area.

BP has already undertaken projects in the same region as the SCP, notably the Western Route Export Pipeline (WREP) constructed in 1997 and baseline data gathering for the SCP pipeline (undertaken between summer 2000 and spring 2001). A wide array of baseline environmental information applicable to the SCP project was therefore already available. However, where data were lacking or out of date (particularly in relation to assessing oil spill sensitivities), additional environmental baseline data were collected. Environmental baseline data have been collected for the following main topics:

- Botany
- Zoology
- Archaeology
- Geology
- Soils
- Water resources
- Traffic
- Air quality
- Climate and Meteorology
- Noise
- Landscape
- Land Contamination

7.6.2 Socio-economic baseline information

A socio-economic survey was undertaken by local SIA consultants Synergetics, supported by ERM, in all the communities¹ within (or encroaching on land within) 2km of the pipeline or pipe yard, and within 5km of a potential construction camp or major AGI. This zone of influence of

¹ This represents data from a total of 74 communities which were identifiable from the maps available at the time. More detailed maps have identified 83 communities which encroach in some way within the 4km corridor, or a close to a potential construction camp or pipe yard. 90% of the original 74 surveyed communities are still within the revised 83 and the survey data has been considered transferable.

construction and operation was determined on the basis of previous pipeline experience and confirmed as appropriate for Azerbaijan. As sections of the pipeline have been rerouted from time to time in response, in part, to ESIA results, the 'surveyed communities' no longer correspond 100% to the 'pipeline affected communities'². (There are a few communities which have been included in the survey which are no longer considered pipeline affected as they are now outside the 4km corridor. Conversely, there are communities which are now within the corridor which have not been consulted, though it is intended that this will take place during Disclosure.)

Data were collected by the team using standard methodologies for the collection of qualitative and quantitative information. 814 semi-structured 'qualitative' interviews with individual householders or land users in the corridors were undertaken. In addition socio-economic data were collected using a 'quantitative' questionnaire during interviews with 74 community leaders or community representatives. The quantitative questionnaires completed with each community leader covered the following main topics:

- Basic geography
- Population and Demographics
- Labour and livelihoods
- Culture, local administration, decision making and planning
- Infrastructure, resources and services
- Attitudes and perceptions

The number of households interviewed in each settlement reflected the settlement size (one person interviewed per household):

- At least 5 households in small villages (below 1,000)
- At least 10 households in medium size villages (1,001 to 5,000)
- At least 20 households in large settlements (above 5,000)

Due to the homogeneity of the study area (in terms of socio-economic characteristics), the above sample sizes are considered sufficient to provide representative data for the study area as a whole.

Respondents were chosen using a combination of stratified, random and quota sampling techniques. Stratified sampling is adopted to achieve a more representative sample of the study area. This is achieved by dividing ones study area into groups of 'sampling units'. Within each of these sampling units, a random sample is then selected. Thus, for the SCP project, sampling units were based on income levels and associated living conditions. Where these existed, random sampling was conducted within each of these groups.

Random sampling selects households based on criteria that do not introduce any biases into the sample. Thus, every third house on the left hand side of the street was selected. Where the settlement was homogenous (in terms of income levels), only random sampling was carried

² Pipeline Affected Communities are defined as those within (or which partly encroach on) a 2km corridor either side of the pipeline or pipe yard, within 100m of an access road, 5km of a construction camp or major AGI. A list of known Pipeline Affected Communities can be found in Part 11 of Baseline Reports (Appendices).

out. Households are selected at random until the desired sample size is reached (eg 10 households for medium sized villages).

Within the stratified and random sample groups, a quota sampling technique was introduced. This technique aims to obtain a cross-section of the population by setting a quota for number of questionnaires per category identified. A quota sample can be based on either one or a combination of variables (eg gender, levels of income, ethnicity). A designated number of respondents for each category is then selected from the population. In the socio-economic survey for this project, a quota on the number of men and women to be interviewed was introduced (ie a male:female ratio of 50:50). Where possible, a cross section of age groups were interviewed, although no official target was set for this.

Data gathered and analysed from the quantitative and qualitative surveys were cross-checked with each other and with census data. It was collected in a format that could easily be transferred to a database and GIS for later analysis using SPSS³, and mapping of attitudes and impacts.

In addition to the initial baseline surveys, some specific interviews were undertaken as the project design process progressed. For example, the project needed to understand villagers perceptions in relation to cumulative effects of two pipelines, and attitudes to oil vs. gas pipelines. Villages included in this survey were identified to ensure that a representative sample of the population of pipeline affected communities were included. Factors taken into consideration included, geographical spread and size of communities, gender and age distribution of respondents.

In addition to village level data, the consultants also collected socio-economic data from Government officials in the regional centers and towns, census data and economic data from international sources.

7.7 ENVIRONMENTAL AND SOCIAL HAZARD AND RISK ASSESSMENT

Environmental Hazard and Risk Assessment (EHRA) and Social Risk Assessment (SRA) are processes whereby the ESIA team can:

- Confirm its understanding of the project with the design engineers
- Identify to the design engineers areas of potential environmental concern
- Jointly develop alternatives so that potential impacts can be avoided where possible, or proactively mitigated.

EHRAs/SRAs meetings were conducted with key project engineers and HSE advisors and were facilitated by members of the ESIA team. They provided an opportunity to gather additional information on the project where necessary. Each meeting allowed input from all participants in the identification of potential environmental and social hazards associated with the project activities. In addition possible alternatives and options were evaluated.

³ Standard Specialist Software designed to assist in the analysis of data gathered through interviews and questionnaires.

The process considered each activity that will, or may, occur during the project including:

- Planned routine activities
- Planned but non-routine activities
- Unplanned or accidental activities.

This process culminated in the development of a list of activities and the identification of aspects that may affect the environment or local communities. It is important to note that existing mitigation measures designed into the project were considered during these meetings.

7.8 ENVIRONMENTAL ASPECT AND IMPACT IDENTIFICATION

Once baseline information had been collated, predictions and modelling of potential changes resulting from the proposed SCP development were conducted. This was undertaken through identification of the projects aspects and impacts resulting from each activity during construction and operation.

7.8.1 Environmental aspect identification

The ISO's standard for Environmental Management Systems (EMS), ISO 14001 defines an environmental aspect as:

'An element of an organization's activities, products or services that can interact with the environment.'

This definition has been used in the identification of the proposed project's environmental, legal and socio-economic aspects. To identify project aspects, all proposed activities, have been considered in terms of their direct or indirect potential to:

- Breach relevant policy, legal and administrative frameworks including HGA and national legislation, relevant international legislation, standards and guidelines, and corporate environmental policy and management systems
- Interact with the existing natural environment including its physical and biological elements
- Interact with the existing socio-economic environment

Activities assessed during site preparation, construction, reinstatement, operation and decommissioning include:

- Planned routine activities
- Planned but non-routine activities
- Unplanned or accidental events

7.8.2 Environmental impact assessment

ISO 14001 defines environmental impact as:

'Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services.'

An impact may result from any of the identified project aspects. Table 7-1 illustrates the links between activity, aspects and impact.

Table 7-1 Examples of project-related activities, aspects and impacts

ACTIVITY	ASPECT	IMPACT
Handling hazardous materials	Potential for accidental spillage	Contamination of soil or water
		Mortality of flora and fauna
Use of vehicles	Diesel exhaust emissions	Contribution to global warming and ground level ozone
	Fuel and oil leaks	Contamination of soil or water
	Noise	Disturbance to surrounding environment/ dwellings

The aspects and impacts of the SCP project have been identified for each activity undertaken and are summarized in Section 10, Environmental Impacts and Mitigation, Table 10-1.

Impacts may be direct or indirect. Indirect impacts are often produced away from the project as the result of a complex pathway, for example the interruption to groundwater flow may result in vegetation dieback and damage at a remote wetland. In addition impacts may be further divided into residual, cumulative and trans-boundary. These types of impact are discussed below. During the impact appraisal process all types of potential impact have been addressed (see Section 10, Environmental Impacts and Mitigation).

The ROW encounters not only significantly different terrains in Azerbaijan but also varying climatic conditions, vegetation and landscape. In view of these changing factors along the route the ROW has been separated into units (linear or point), each of which have common characteristics with regard to the following three factors:

- Project activities (that could result in impacts)
- Biotope (similar physical and biological environments, eg mountainous coniferous forest)
- Environmental sensitivity

Archaeologically sensitive sites or river crossings are units of limited geographic extent (point units) whilst forest habitats or faunal sanctuaries may have a broader geographic extent (linear units).

Some elements of the project will occur at a distance from the ROW, for example, construction traffic, camps and construction yards are activities off the ROW and therefore are discussed independently from the ROW units.

7.8.2 Social impact assessment

The evaluation of socio-economic impacts involves the assessment of both quantitative and qualitative data and the use of professional judgment. Quantitative data collected through national sources or local level interviews is assessed and analysed by traditional economic or sociological techniques. However, qualitative data collected using the same methodology is more open to interpretation. In addition, what is a major impact to one person, one household or one community may be a minor impact to another according to specific personal

circumstances. Hence, the results do not lend themselves easily to being ranked or assessed in exactly the same way as environmental data. As a result, the application of assessment language in the evaluation of results tends to be more qualitative in relation to the socio-economic impacts than in the equivalent environmental sections.

Another difference is the use of the terms Issues and Impacts. Issues can be broadly defined as an element requiring consideration and assessment for which a policy or a specific mitigation strategy may need to be defined. Impacts are elements with a potential direct or indirect impact on a specific household, community or sector of a community. In this sense, the overall management of community relations is an issue, where the need to compensate a farmer for the removal of his fence would be described as an impact.

In assessing the scale of the issues and impacts, the following factors are taken into consideration:

- The likelihood of the impact
- Changes to the assets that households depend upon for their livelihoods
- The duration of this change: short-term disturbance (eg during construction only), long term (eg during operation period) or permanent
- The manageability of the change and potential for it to lead to further changes beyond the control of the project
- The ability of the affected people to adapt to changes and thus maintain livelihoods over the long-term
- The magnitude of the impact is then viewed from the perspective of those affected, by taking into account the perceived importance of the impact or perceived impacts in the eyes of communities

Field survey data have been used to help identify specific communities in which a particular aspect of the project, or potential impact, is likely to be particularly important or to have a particularly acute, or chronic, effect. Where these impacts are quantifiable statistical data have been provided.

7.8.3 Impacted groups

Socio-economic impacts apply and are assessed at the household and community levels. Different households will often be affected in different ways by the same impact. It is therefore necessary to assess variation in impacts between different households. For example, a poor household dependant upon natural resources over which it has no legal rights may not have access to compensation or may be ill equipped to use compensation money in an appropriate way. However, since most of the communities within the pipeline corridor have a similar economic profile, many of the impacts can be assessed at the community level in order to develop further specific community level mitigation measures where appropriate.

Impacts, such as wealth creation or demographic change, are also assessed at a more macro level where appropriate in order to capture the cumulative impacts caused by the whole project as well as its individual parts.

7.9 MITIGATION OF POTENTIAL IMPACTS

Mitigation measures are the actions or systems that are used, or have been proposed, to manage or reduce a potential negative impact or enhance a positive impact.

Mitigation has been an integral part of the SCP project, from conceptual design through to construction and operation. Mitigation measures are generally identified to avoid, minimise or remedy the adverse effects of impacts. They may also be used to enhance the positive benefits of the project, especially in relation to social issues. They are developed using professional judgment and experience within the legal, technical, political and economic constraints of the project and may involve policy changes, technical solutions or various forms of compensation. The project team, community and other stakeholders have been consulted to ensure that the mitigation measures are both practical and appropriate.

Mitigation measures, either already implemented or proposed for the SCP project are discussed in Sections 10, Environmental Impacts and Mitigation, 11, Socio-Economic Impacts and Mitigation, and 12, Residual Impacts, and include:

- Routing of pipeline to avoid areas of high sensitivity
- Measures in the original project design (eg ensuring the pipeline goes around and not through people's houses)
- Engineering design solutions during the ESIA process (eg moving a site for spoil, increasing pipe thickness)
- Alternative solutions to processes and methods to achieving objectives (eg methods of transporting materials, or recruitment of unskilled workers)
- Operational control procedures (eg fines for damage outside the ROW)
- Conservation management
- Management systems (eg reporting mechanisms for Community Liaison officers and Key Performance Indicators (KPIs)/targets for contractors)
- Development of policies and procedures (eg Statement of Social Objectives for the project, compensation plans for land/livelihoods)
- Timing restrictions (eg construction activities near villages and schools)

Following assignment of mitigation measures, any impact that remains is termed a **residual impact**. Assessment of residual impacts is discussed in the following section.

7.10 RESIDUAL IMPACTS

The flow diagram below illustrates the process of addressing potential and residual impacts (Figure 7-3).

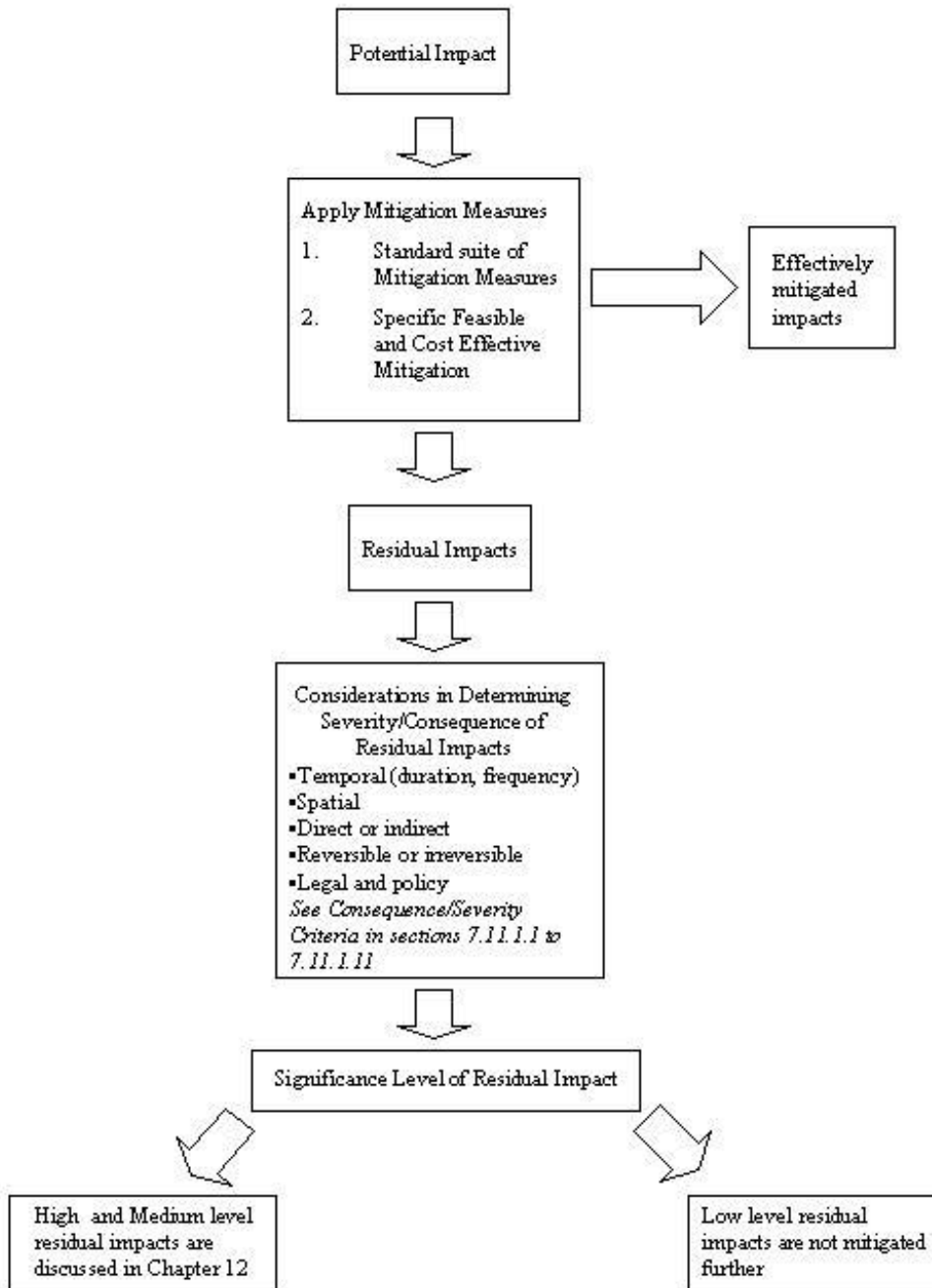
Any impacts remaining after mitigation measures have been applied are considered residual impacts. The significance level of the residual impact is assessed on the basis of:

- The severity/consequence of an impact
- The likelihood that the impact will occur

The significance level is ranked on four levels: High, Medium and Low, or Beneficial. These

rankings are used for both environmental and social residual impacts. Evaluating the level of residual impact is discussed further in Section 7.9.4.

Figure 7-3 Considerations in determining severity/consequence of residual impacts



7.10.1 Consequence/severity of residual environmental impacts

As shown in Figure 7-3, residual environmental impacts have their consequence/severity determined, on a one to five tiered scale, using Impact Consequence Criteria. These Criteria

have been developed for key issues listed as dot points below, and are contained in sections 7.10.1.1 to 7.10.1.11. There are a number of considerations that have been built into these Impact Consequence Criteria including temporal, spatial, impact reversibility, direct and indirect impacts, and relevant legal or policy constraints.

- Noise
- Air quality
- Traffic
- Ecology
- Soils
- Archaeology
- Social
- Contamination of land
- Landscape
- Water Resources

It should be noted that it is often difficult to compare residual impacts consistently across different natural and socio-economic environments. Scientific evidence as well as predictions based on observation of similar activities has been used in the impact assessment process. Where this is not possible qualitative judgment has been used to ascribe impact based on the project and ESIA team's extensive experience and knowledge.

7.10.1.1 Noise (for human receptors)

Table 7-2 Ranking of noise consequence/severity

CATEGORY	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
Ranking	1	2	3	4	5
Construction	Ambient noise level raised by <3dBA (not perceptible by most people) and less than $L_{Aeq\ 5\ minutes\ 70/75\ dB(A)}^1$ outside dwellings between agreed daytime working hours and limit of $L_{eq\ (1-hour)\ 45\ dB(A)}^2$ at night (to avoid sleep disturbance)	Ambient noise level raised by 3-5dBA and less than $L_{Aeq\ 5\ minutes\ 70/75\ dB(A)}$ outside dwellings between agreed daytime working hours and limit of $L_{eq\ (1-hour)\ 45\ dB(A)}$ at night	Ambient noise levels at sensitive receptors raised by 6-10dB (A) and less than $L_{Aeq\ 5\ minutes\ 70/75\ dB(A)}$ outside dwellings between agreed daytime working hours and limit of $L_{eq\ (1-hour)\ 45\ dB(A)}$ at night	Ambient noise levels at sensitive receptors raised by >10dB (A); or exceedance of $L_{Aeq\ 5\ minutes\ 70/75\ dB(A)}$ outside dwellings between agreed daytime working hours and limit of $L_{eq\ (1-hour)\ 45\ dB(A)}$ at night	As for Level 4 and either tonal or impulsive noise present.
Continuous operational noise in residential areas	$L_{eq\ (1-hour)\ <45\ dB(A)}^3$ at night and $L_{eq\ (1-hour)\ <55\ dB(A)}^3$ during the day	$L_{eq\ (1-hour)\ <45\ dB(A)}$ at night and $L_{eq\ (1-hour)\ <55\ dB(A)}$ during the day but ambient noise level raised by no more than 3dBA	$L_{eq\ (1-hour)\ <45\ dB(A)}$ at night and $L_{eq\ (1-hour)\ <55\ dB(A)}$ during the day but ambient noise levels at sensitive receptors raised by 3-6dB (A)	Exceedance of $L_{eq\ (1-hour)\ <45\ dB(A)}$ or $L_{eq\ (1-hour)\ <55\ dB(A)}$ during the day As guidance any operational noise of duration greater than 1 hour and exceeding the above standards and that is more frequent than once per	Exceedance of $L_{eq\ (1-hour)\ <45\ dB(A)}$ or $L_{eq\ (1-hour)\ <55\ dB(A)}$ during the day and tonal or impulsive noise present As guidance any operational noise of duration greater than 1 hour and exceeding the above standards

Table 7-2 Ranking of noise consequence/severity

CATEGORY	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
				week	and that is more frequent than once per week
Continuous operational noise in industrial/commercial areas	$L_{eq(1-hour)} < 70$ dB(A) ³	$L_{eq(1-hour)} < 70$ dB(A) and ambient noise level raised by no more than 3dBA	$L_{eq(1-hour)} < 70$ dB(A) ambient noise levels at sensitive receptors raised by 3-6dB (A)	Exceedance of $L_{eq(1-hour)} 70$ dB(A)	Exceedance of $L_{eq(1-hour)} 70$ dB(A) or $L_{eq(1-hour)}$ and tonal or impulsive noise present

1 World Bank Group “Pollution Prevention Abatement Handbook – General Environmental Guidelines”. Recommended level for Industrial installations.

2 WHO “Guidelines for Community Noise” (1999).

3 World Bank Group “Pollution Prevention Abatement Handbook – General Environmental Guidelines”. For a residential area, the World Bank recommend that daytime limits do not exceed LAeq 55dB daytime, and LAeq 45dB night-time, or a maximum 3dBA increase than the existing noise level should the existing ambient noise level already exceed 45dBA.

4 World Bank Group “Pollution Prevention Abatement Handbook – General Environmental Guidelines”

5. Duration – Should any of the construction impacts occur for more than 2 weeks, the next consequence/severity level up will be used.

7.10.1.2 Air quality

Table 7-3 Ranking of air quality consequence/severity

CATEGORY	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
Ranking	1	2	3	4	5
Short term (<24 hours) concentrations	Process concentrations that are not discernable	Process concentrations that are <75% of the EU standards	Process concentrations that are 75-100% of the EU standards	Process concentrations that are 100-149% of the EU standards	Process concentrations that are >150% of the EU standards
Long term (>24 hours) concentrations	Maximum process and baseline concentrations are <10% of the EU standards	Maximum process and baseline concentrations are 10-20% of the EU standards	Maximum process and baseline concentrations are 20-50% of the EU standards	Maximum process and baseline concentrations are 50-100% of the EU standards	Maximum process and baseline concentrations are >100% of the EU standards
	Maximum process annual emissions are <0.5% of the Azerbaijan National	Maximum process annual emissions are 0.5-2% of the	Maximum process annual emissions are 2-5% of the Azerbaijan National	Maximum process annual emissions are 5-10% of the Azerbaijan National	Maximum process annual emissions are >10% of the Azerbaijan National

Table 7-3 Ranking of air quality consequence/severity

CATEGORY	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
	Emissions Inventory values	Azerbaijan National Emissions Inventory values	Emissions Inventory values	Emissions Inventory values	Emissions Inventory values

Note: EU standards refer to ambient air quality (Section 10).

7.10.1.3 Dust

Table 7-4 Ranking of dust consequence/severity

CATEGORY	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
Ranking	1	2	3	4	5
Construction Nuisance	No measurable or notable increase	Measurable and notable increase in dust levels	Nuisance to people but no adverse health effects or on crops/property	Significant nuisance to people or with sensitive individuals affected, or minor property or crop damage	Very significant nuisance to people with measurable health effects, or significant damage to property or crops

Note 1: Nuisance takes account of duration by the inherent assumption that in order to cause a nuisance the impact must last for a reasonable duration (eg. greater than one week or repeated impacts).

Note 2: The above criteria are qualitative in nature, but require professional judgement in order to assign the appropriate ranking

7.10.1.4 Traffic impact

The approach for determining severity/consequence for traffic impacts relates to changes in traffic flow and the presence of receptors, as well as the duration of the impact. Impacts upon the road system itself will be limited by upgrading of the roads required to the standards required to enable project activities, such as heavy vehicle movement.

The presence of receptors (eg built-up areas, villages, schools, pedestrians, etc) is a necessary prerequisite in order for impacts to occur. The next consideration is the percentage increase in traffic flow, with the following rankings assigned:

- Not measurable – Very Low
- <5% increase – Low
- 6-10% increase – Medium
- 11-20% increase – High
- >20% increase – Very High

The final consideration in determination on the consequence/severity level is that the duration of the impact. Should any of the above noted increased traffic flows be predicted to occur for

more than two weeks duration, the next consequence/severity level up will be used.

7.10.1.5 Ecology

The consequence/severity of ecological impact has been evaluated taking account of the following factors:

- The magnitude of the impact, as determined by its intensity, its extent in space and time and the likelihood of it occurring
- The vulnerability of the habitat or species to the change caused by the impact
- The ability of that species or habitat to recover
- The value, in nature conservation and ecological terms of affected receptors including species, populations, communities, habitats, landscapes and ecosystems

Any contravention of legislation relating to conservation is considered to be a High (4) consequence/severity.

Table 7-5 Ranking of ecological consequence/severity

CATEGORY	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
Ranking	1	2	3	4	5
Habitat integrity	Impact on the habitat integrity ¹ largely not discernable	Loss of habitat integrity not measurable using standard techniques	Reduction in integrity of regionally (in the country context) important habitat using standard techniques	Reduction in integrity of nationally important habitat using standard techniques	Reduction in integrity of internationally important habitat using standard techniques
Species behaviour and interactions	No discernable effect due to disruption ² on behaviour or species interactions	Disruption of behaviour or species interactions discernable using standard techniques	Disruption of behaviour or species interactions of regionally (in the country context) important species discernable using standard techniques	Disruption of behaviour or interactions of nationally important species discernable using standard techniques	Disruption of behaviour or interactions of internationally important species discernable using standard techniques
Habitat/species recovery (temporary landtake)	Immediate return to baseline conditions on completion of reinstatement activities	Return to baseline conditions within 2 years on completion of reinstatement activities	Return to baseline conditions within 2-5 years on completion of reinstatement activities	Return to baseline conditions after 5-10 years on completion of reinstatement activities	Return to baseline conditions after >10 years on completion of reinstatement activities
Protected	Not impacting	Activities may	Potential to	Potential to	Contravenes the

Table 7-5 Ranking of ecological consequence/severity

CATEGORY	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
Habitats	an area affected by national laws, international conventions, company policies or IFI Policies	temporarily disturb protected areas but not lead to any long-term effects on the ecological integrity of the protected area	contravene the very high (5) category; assuming re-instatement likely within three years	contravene the provisions or intent of national laws, international conventions, company policies or IFI Policies after mitigation, assuming full re-instatement to pre-disturbance condition within five years	provisions or intent of national laws, international conventions, company policies or IFI Policies.

Note 1 Ecological integrity includes issues such as loss of habitat, fragmentation of habitat, disruption and loss of wildlife corridors, ecological carrying capacity.

Note 2 Disruption due to physical changes, noise, visual intrusion and air emissions behaviour on, for e.g. breeding, nesting, mating/spawning, diurnal and seasonal migration, hibernation, territorial activities, predator-prey relationships and ultimately mortality

7.10.1.6 Soils

The severity/consequence of impacts on soils has been evaluated by taking account of the following factors:

- The magnitude of the impact, as determined by its intensity and extent in space and time;
- The vulnerability of the soils to the change caused by the impact; and
- The ability of the soils to recover from the impact.

Table 7-6 Ranking of consequence/severity on soil

CATEGORY	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
Ranking	1	2	3	4	5
Soil erosion	Soil erosion generally not discernable	Soil erosion predicted to occur at approximately the same rate as soil formation	Soil erosion predicted to be visibly active but no rill and gully formation evident	Rill and gully formation predicted to be evident	Rill and gully formation predicted to be extensive
Reduced soil productivity	Productivity losses generally not discernable	Productivity losses are discernible and predicted to last less than three months after construction	Limited productivity losses predicted to last less than one year after construction but more than three months	Moderate areal extent of productivity losses predicted to last more between one and five years after construction	Productivity losses are predicted to be extensive last more than five years after construction
Waterlogged	Water logging	Water	Water predicted	Water predicted	Water

Table 7-6 Ranking of consequence/severity on soil

CATEGORY	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
soils	generally not discernable	predicted to remain in surface depressions less than three months after construction	to remain in surface depressions less than one year after construction but more than three months	to remain in surface depressions for between one and five years after construction	predicted to remain in surface depressions permanently
Sediment transport to water courses	Visible sediments generally not discernable	Visible sediment predicted in watercourses for less than three weeks after construction and no obscuration of the bed	Visible sediment predicted in watercourses for longer than three weeks after construction but no obscuration of bed	Visible sediment predicted in watercourses for longer than three weeks after construction and obscuration of the bed	Permanent features in watercourses

7.10.1.7 Cultural heritage

Information on archaeological features normally only becomes available during the construction phase of the project due to the intrusive nature of the process. Therefore, the assignment of accurate consequence/severity prior to the construction phase is often not possible. Nonetheless, there are a number of factors to be taken into account in assigning the consequence/severity of a potential impact on archaeology.

A matrix has been employed in order to be able to determine the consequence/severity of the impact by taking account of the protected status and the potential for destruction of archaeological remains

Table 7-7 Ranking of consequence/severity on cultural heritage

RANKING	1	2	3	4	5
Potential for Destruction	Deposits will not be affected, because of distance from the pipeline, or method of construction.	A small (1-10%) proportion of the surviving deposits damaged or destroyed	A moderate (10-25%) proportion of the surviving deposits damaged or destroyed	A large (25-50%) proportion of the surviving deposits damaged or destroyed	Most (50-100%) of the surviving deposits damaged or destroyed
Protected Status	Resources whose importance is unknown, sites of uncertain date or character	Resources which have little or no archaeological or historical value, or where remains may have been previously destroyed	Locally important resources of low or minor importance	Regionally important resources of a reasonably defined extent, nature and date and significant	Internationally and nationally important resources, legally protected remains of national importance

				examples in a regional context	
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A 1 to 5 score is assigned for both “Potential for Disturbance” and “Protected Status” using the above table. These scores are entered into the matrix below and the final consequence/severity score determined by multiplying the Potential for Destruction score by the Protected Status score, and dividing by five.

Potential for Destruction	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5
		1	2	3	4	5

Protected Status

7.10.1.8 Contamination of land due to project activities

Table 7-8 Ranking of contamination of land consequence/severity

CATEGORY	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
Ranking	1	2	3	4	5
Description	Concentrations below DIV	DIV concentrations exceeded by <25% in project area and can affect receptors	DIV concentrations exceeded by 25-50% in project area and can affect receptors	DIV concentrations exceeded by 50-100% in project area and can affect receptors	DIV concentrations exceeded by >100% in project area and can affect receptors

¹ DIV refers to Dutch Intervention Standards used internationally as screening criteria. The DIV Intervention Standards are levels at which intervention to clean up is recommended. Their use here is to provide a measure of impact rather than as a trigger level for intervention during construction should any contamination be exposed

7.10.1.9 Landscape

Assessing the consequence/severity of landscape and visual impact is a qualitative process, which relies upon subjectivity and reasoned judgment supported where possible by evidence.

Table 7-9 Ranking of consequence/severity on visual receptors and landscape

CATEGORY	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
Ranking	1	2	3	4	5
Impact on Visual Receptors (resident and transitory)	Change in view not discernable from most viewpoints	Few viewpoints affected / minor change in view	Many viewpoints affected / moderate changes in	Majority of viewpoints affected / major changes in view	All of viewpoints affected

Table 7-9 Ranking of consequence/severity on visual receptors and landscape

CATEGORY	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
			view		
Duration, and extent of change in landscape / Quality and value of Landscape	No noticeable change in landscape / or landscape is low quality	Virtually imperceptible change in the landscape; or Reinstatement within 1-2 years	Changes in the natural landscape in a localized area; or Reinstatement in 2-5 years	Change in natural or high value landscape over an extensive area; or Reinstatement in 5-10 years	Change in natural or high value landscape over an extensive area; and Reinstatement not possible

7.10.1.10 Groundwater – quality and quantity

Table 7-10 Ranking of groundwater consequence/severity

CATEGORY	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
Ranking	1	2	3	4	5
For groundwater used, or may be used, as a resource, being of sufficient quantity and quality	No discernible change in groundwater baseline conditions <i>and</i> no discernible change in groundwater resource quantity.	Change of <25% in any parameter from the DIV ¹ criteria <i>or</i> depletion of resource that does not recover within 6 months post construction (within 10% of original elevation).	Change of 25-50% in any parameter from the DIV ¹ criteria <i>or</i> depletion of resource that does not recover within 6-12 months post construction (within 10% of original elevation).	Change of 50-100% in any parameter from the DIV ¹ criteria <i>or</i> depletion of resource that does not recover within 1-2 years post construction (within 10% of original elevation).	Change of >100% in any parameter from the DIV ¹ criteria <i>or</i> depletion of resource that does not recover after 2 years post construction (within 10% of original elevation).
Effect on beneficial users	No effect	Temporary effect	Short term but reversible effect	Long term but reversible effect	Permanent and irreversible effect

¹ DIV refers to Dutch Intervention Standards. The DIV Intervention Standards are levels at which intervention to clean up is recommended. Their use here is to provide a measure of impact rather than as a trigger level for intervention should contaminated groundwater be encountered during construction.

7.10.1.11 Surface Water – quality and quantity

Table 7-11 Ranking of surface water consequence/severity

CATEGORY	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
Ranking	1	2	3	4	5
For surface water used, or may be used, as a resource, being of sufficient quantity and quality	No discernible change in surface water baseline conditions and no discernible change in downstream river discharge.	Change of <25% in any parameter from the DIV ¹ ; or visible sediment observed for less than 3 weeks; or <15% decrease of downstream river discharge for no more than 1 day.	Change of 25-50% in any parameter from the DIV ¹ ; or visible sediment observed for more than 3 weeks; or 15-40% decrease of downstream river discharge for 1-2 days.	Change of 50-100% in any parameter from the DIV ¹ ; or visible sediment observed for more than 3 weeks; or >40% decrease of downstream river discharge for 2-3 days.	Change of >100% in any parameter from the DIV ¹ ; or visible sediment observed for more than 3 weeks; or >40% decrease of downstream river discharge for >3 days.
Effect on Beneficial Users	No effect	Temporary effect	Short term but reversible effect	Long term but reversible effect	Permanent and irreversible effect

¹ DIV refers to Dutch Intervention Standards. The DIV Intervention Standards are levels at which intervention to clean up is recommended. Their use here is to provide a measure of impact rather than as a trigger level for intervention (See Annex B)

7.10.2 Likelihood

To assign likelihood of residual impact, five criteria were defined and ranked. This five-tiered likelihood ranking criteria are in line with international practices (e.g. Australian/New Zealand Risk Management Standard AS/NZS: 4360). The criteria for likelihood are shown in Table 7-12.

Table 7-12 Likelihood categories and rankings natural and socio-economic impacts

RANKING	DEFINITION
5	The impact will occur under normal operating conditions.
4	The impact is very likely to occur under normal operational conditions.
3	The impact is likely to occur at some time under normal operating conditions.
2	The impact is unlikely to but may occur at some time under normal operating conditions.
1	The impact is very unlikely to occur under normal operating conditions but may occur in exceptional circumstances.

7.10.3 Evaluating level of residual environmental impact

The residual environmental impacts are assigned a level of significance based on the likelihood of the impact and the consequence of that impact. For each residual impact a consequence/severity ranking between 1 and 5 has been assigned using the impact criteria tables above. The likelihood is assigned using Table 7-13. The significance level of residual environmental impact is then determined using the matrix below where L denotes a Low-level of impact, M a Medium-level and H a High-level.

Table 7-13 Level of residual environmental impact

LIKELIHOOD	5	L	M	M	H	H
	4	L	L	M	M	H
	3	L	L	M	M	M
	2	L	L	L	M	M
	1	L	L	L	L	M
		1	2	3	4	5
		CONSEQUENCE/SEVERITY				

Note 1. A residual impact of Medium is ascribed to a level 5 impact for a likelihood of 1, even though it is very unlikely to occur.

7.10.4 Residual social impacts

As per environmental impacts, residual social impacts are any potential impacts remaining once mitigation measures have been implemented. However, in the case of socio-economic impacts, these may not be directly related to the aspects of the project, but may arise from unmet expectations or difficulties in communication (eg access to energy, or in relation to employment opportunities).

Once identified, these residual impacts are assessed according to their significance for individuals or communities according to the table below. Note that the same ranking system is used as for residual environmental impacts ie High, Medium, Low and Beneficial. A comment on the likelihood of the residual impact is also provided.

IMPACT CATEGORY	SOCIAL IMPACT
Beneficial	Improvement in the ability of household or settlement to maintain or improve its livelihood/store of assets Enhancement in quality or availability of resource leading to improvement in quality of life. For example: <ul style="list-style-type: none"> • Enhancement in physical capital including availability of infrastructure • Enhancement in social capital, including skills for future employment • Enhancement of relationship between BP/Construction Contractor and communities • Enhancement in health and safety of local population

IMPACT CATEGORY	SOCIAL IMPACT
Low	<p>Possible short term decrease in availability of resource or access to infrastructure not affecting livelihood</p> <p>Possible short term decrease in quality of life of household or settlement not affecting long term outcomes</p> <p>No effect on human health</p> <p>No discernable long term effect of the local economy</p> <p>Impacts which are long lasting but to which the community is able to adapt, such as increased access to information/possible slow cultural change/changes in economic structure</p>
Medium	<p>Potential effect or perceived effect on ability of household to maintain livelihood/store of assets in short term</p> <p>Potential reduction in quality of life in short term</p> <p>Potential disruption to lifestyle in short term</p> <p>Perception of missed opportunity to improve</p> <p>Possible decrease or perceived decrease in access to infrastructure to which community is unable to adapt in the short term</p> <p>Quality of life</p> <p>Negative effect on human health which can be contained and is therefore short term with no increased mortality</p> <p>Impacts which may result in high levels of complaint in the short term</p>
High	<p>Negative effect on safety of humans or animals</p> <p>Negative effect on human health which can not be contained or results in increased mortality</p> <p>Effect or perceived effect on ability of household to maintain livelihood/store of assets to an extent not acceptable to affected people</p> <p>Permanent or perceived permanent reduction in quality of life</p> <p>Permanent cultural change to which the communities are unable to adapt</p> <p>Widespread perception of missed opportunity to improve quality of life, resulting in frustration and disappointment</p> <p>Result in tensions with communities which lead to sabotage to pipeline construction or operation by local communities, or outbreaks of violence between workers and communities</p>

7.10.5 Addressing residual impacts

The following approach is applied to addressing environmental and social residual impacts.

High (H)

- Check that the residual impact has been subject to feasible and cost effective mitigation where possible
- Where no further reduction in impact levels can be made, it remains a High-level impact and which may therefore be subject to compensation or offsets

Medium (M)

- Check that the residual impact has been subject to feasible and cost effective mitigation and that no further measures are practicable

Low (L)

- Not mitigated further

An assessment of the significance of the residual impacts from the SCP was undertaken and the results are presented and discussed in Sections 10, Environmental Impacts and Mitigation, and 11, Socio-Economic Impacts and Mitigation. Further discussion of residual impacts is provided in Section 12, Residual Impacts.

7.11 CUMULATIVE IMPACTS

The December 1998 IFC “Procedure for Environmental and Social Review of Projects” states that that an environmental assessment should also address cumulative impacts. The objective of the cumulative impact assessment is to identify those environmental and/or socio-economic aspects that may not on their own constitute a significant impact but when combined with impacts from past, present or reasonably foreseeable future activities associated with this and/or other projects, result in a larger and more significant impact(s). Examples of cumulative impacts include:

- The recurring loss of habitat in areas that are disturbed and re-disturbed over an extended period
- Additional emissions as a processing plant is extended and expanded over a period of time
- The ongoing development of employment opportunities and enhancement of local labour skills base as successive projects (related or unrelated) come on stream

Cumulative impacts considered in this ESIA relate to impacts due to SCP project and:

- The development of the BTC project
- Developments in local industry and associated projects
- Silk Road development
- ACG full field development
- Catastrophic failure of the BTC pipeline

The project also considers the cumulative impacts of SCP on the WREP pipeline in those locations where the corridor, and therefore the pipeline-affected communities, are the same.

Cumulative impacts have been assessed for the SCP ESIA and the results are presented in Section 13.

7.12 TRANSBOUNDARY IMPACTS

The World Bank document OP 4.01 stipulates that transboundary impacts (eg impacts that cross the border of Azerbaijan into neighbouring countries) should be considered during the ESIA process. The assessment of transboundary impacts for the SCP ESIA examines:

- Air emissions
- Oil spill migration

The significance of identified transboundary impacts has been assessed broadly using the methodology described above, and is presented in Section 13.

7.13 REGULATORY APPROVAL PROCESS

Until May 2001 the national environmental regulatory body of Azerbaijan was the State Committee of Ecology and Nature Use Control (ASCE). The ASCE has now been replaced by the Ministry for Ecology and Natural Resources (MENR), which also take over the responsibility for reviewing the ESIA. Further information on the formation of the MENR can be found in Section 6, Legislation and Policy Framework.

The expert review and approval of environmental documentation, including this ESIA, will be carried out by the MENR over a 30 day period, in accordance with the procedures described in the Host Government Agreement.

This ESIA report, once approved by the MENR, will enable the project to proceed based on the concepts, strategies and commitments that are contained in the report. During this review process, new commitments or modifications to those presented in this ESIA may arise in order to satisfy the needs and opinions of the reviewing authority. Further commitments may arise in order to address key concerns raised by members of the public.

The approval document from the MENR acts in effect as a permit for the various planned operations, discharges and emissions that are documented and will remain effective throughout the entire project. If, for technical or other reasons, changes are required in the project description that might alter the impacts arising from the SCP project, these will be conveyed to the MENR; the environmental implications will be assessed and any additional mitigation measures agreed with the MENR.

7.14 MANAGEMENT AND MONITORING

To assist in the management and implementation of the measures designed through the ESIA, and the monitoring of their effectiveness, Environmental and Socio-economic Management and Monitoring Plans have been developed. These are presented in Section 14. The plans describe the management and monitoring strategies and present generic procedures for their implementation. Further, they identify the roles and responsibilities for implementation and for ensuring that monitoring is undertaken, that the results are analysed and any necessary amendments to practices are identified and implemented in a timely manner.

Monitoring during the construction and operational phases of the project, through the audit of impact predictions and mitigation measures, will ensure:

- That mitigation measures are implemented effectively
- That mitigation measures are appropriate and if not, that they are amended or additional measures designed and implemented
- Compliance with international standards, guidelines and best practice, and BP corporate policies, and international best practice
- Assessment of cumulative and residual impacts, so that appropriate measures can be designed if necessary
- The perpetuation of the ESIA as an iterative process

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8 ENVIRONMENTAL BASELINE

8.1 INTRODUCTION

This section provides a summary of the environmental baseline information collected for the SCP project. The purpose of the environmental baseline characterisation is to:

- Document environmental conditions along the proposed route prior to the commencement of the project
- Evaluate those environmental components that might affect, or be affected by, the construction or operation of the SCP system

It is important to note that the baseline conditions immediately prior to construction of the SCP will be a partially reinstated ROW from the construction of the BTC pipeline (as discussed in Section 5, Project Description). This section summarises current baseline conditions, (ie, those prior to construction of both the BTC and SCP pipelines).

More detailed baseline reports and descriptions of the environment are provided in Parts 1-11 of the Baseline Reports Appendix. A full list of references is also provided in this Appendix.

8.2 REGIONAL GEOGRAPHICAL SETTING

Azerbaijan is the largest of the three Trans-Caucasian countries covering an area of 86,600 sq. km (roughly the size of Austria) and includes the geographically separate Autonomous Republic of Nakhchevan. Azerbaijan shares land borders with Armenia, Russia (Dagestan), Iran, Georgia and Turkey (via the Nakhchevan exclave). In addition, Azerbaijan has an 825km coastline with the Caspian. Kazakhstan and Turkmenistan are Azerbaijan's immediate neighbours on the opposite, eastern shore of the Caspian.

Azerbaijan is predominately a mountainous country. Average elevation is 384m and 71% of the territory is above 500m, with 3.5% above 2,500m. It is surrounded by three separate mountain ranges. The Greater Caucasus form part of the northern border and include the nation's highest peaks of Bazar-Dyuzi (4,466m), Shakh-Dag (4,243m) and Tufan (4,205m). The Lesser Caucasus consists mostly of mountainous folds with peaks up to 3,900m orientated in a south-easterly direction, towards Iran. These folds form the Shakh-dag, Karabakh and Congur-Alangez ranges. Other ranges of the Lesser Caucasus include the Mrov-dag and Daralagez ranges. As well as ridges, the Lesser Caucasus includes plateaux, mostly of volcanic origin, such as the Karabakh plateau, and lowlands, which extend along the Middle Araks. In the extreme south-east of Azerbaijan are the smaller but ecologically and geographically distinct Talysh Mountains (highest point, Kyumyurkey at 2,477m). The remaining area of the territory consists of lowlands and plains, 18% of it below sea level. Chief amongst these is the central, flat, alluvial Kura-Araks Lowlands, through which the majority of the SCP has been routed. The Kura and Araks Rivers divide these lowlands into three parts: the Shirvan steppe, north from the Kura River; Mil-Karabakh steppe, between the Kura and Araks Rivers; and the Mugan steppe, south of the Araks towards the lower reaches of the Kura River. There are also many small islands along the Caspian coast. The Caucasus region is seismically active and prone to earthquakes; landslides are common in mountains.

8.3 METEOROLOGY AND CLIMATE

8.3.1 Introduction

Several climatic types can be differentiated in Azerbaijan, principally depending on the altitude of the area and distance from the Caspian. The main climate types are:

- Arid subtropical
- Humid subtropical
- Temperate
- Cold

The arid subtropical climate is typical for the Kura-Araks Lowlands where the majority of the SCP route is located. The highest air temperatures occur in the Kura-Araks Lowland and along the Caspian coastline. Average July temperatures are more than +25°C, whilst during the winter temperatures rarely fall below freezing. The average annual temperature in this area is 14-15°C. Average rainfall is 200-400mm per year but can be as little as 150-200mm in semi-desert areas such as Gobustan south of Baku, where summer droughts occur regularly.

Azerbaijan has a number of climate and meteorology measuring stations, some of which are located in the vicinity of the pipeline route. These include the stations at Baku, Puta, Alyat, Kazi-Magomed, Kurdamir, Yevlakh, Ganja, Shamkir, Kazakh and Akstafa (Figure 8-1). Some of the stations have collected meteorological data for many decades (although a number are now closed), which makes the long-term climatic averages relatively reliable. Data have also been obtained for the area of Ganja from the UK Meteorological Office.

Figure 8-1 Location of meteorological stations along the SCP route in Azerbaijan



8.3.2 Temperature

8.3.2.1 Sunshine and solar radiation

The average number of sunshine hours experienced annually along the SCP route is high. The Agroclimatic Atlas of Azerbaijan (1993) shows that most regions receive approximately 2,200 hours of sunshine per annum. Around 60% of this total is incident between June and August when, for example, up to 11 hours of sunshine per day can be expected in Baku. This declines to an average of just three hours per day in winter.

Mean annual solar radiation fluxes alter little along the SCP corridor. They vary between 128 and 132kcalcm⁻² (kilocalories per square centimetre) at the eastern end, and decline to a little less than 124kcalcm⁻² at the slightly cloudier western end, a region with one of the lowest annual solar radiation levels in Azerbaijan. In the winter period, between October and March, the whole route receives only between 36 and 40kcalcm⁻².

8.3.2.2 Air temperature

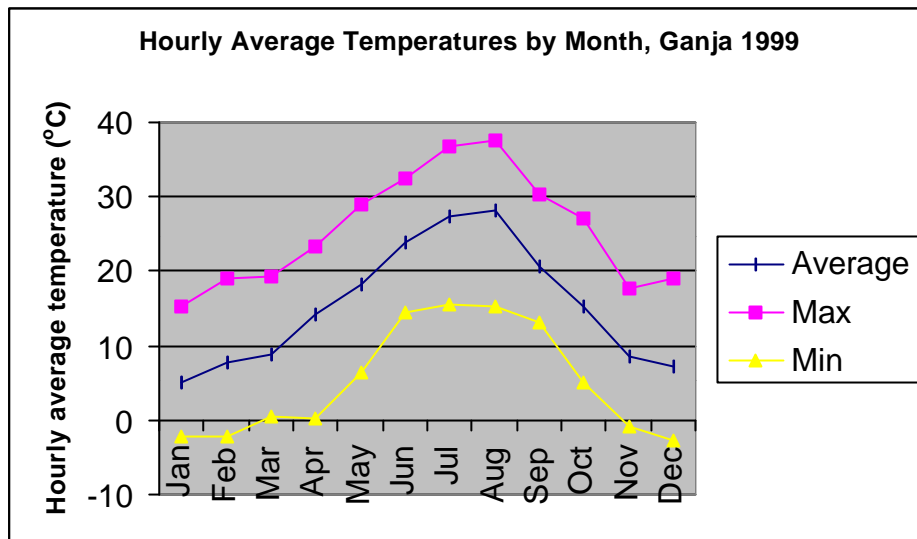
These large inputs of solar energy, combined with limited thermal moderation by cooling vegetation (especially around the eastern semi-desert part of the route) means that air and soil temperatures are high, particularly in the peak of summer. Mean annual air temperature increases steadily eastwards from approximately 12°C at the Georgian border (KP442) to 13.2°C at Ganja (KP340) and 14.6°C at Alyat. Alyat is registered as one of the warmest places in Azerbaijan.

The coldest month is usually January whilst the warmest months are July and August. Mean January air temperatures at Puta and Ganja are 3.4°C and 1.1°C respectively, while in Akstafa the January mean drops to -0.1°C. In July the cooling effect of the Caspian means that average monthly air temperatures are virtually the same at Puta and Ganja (25.8°C and 25.4°C respectively). The hottest parts of the SCP corridor in July are normally in the centre of the country, around Kurdamir and Yevlakh (both 27.3°C). These locations are far enough inland to be isolated from the moderating effects of the Caspian, yet not at a sufficiently high elevation to be affected by altitudinal cooling.

As regards temperature extremes, mean monthly minimum air temperature in January varies from 0.7°C at Puta to -2.4°C at Ganja. Mean monthly maximum air temperatures in July vary from 30.4°C at Puta to 34.6°C at Kurdamir.

Figure 8-2 shows hourly average temperature, by calendar month, for Ganja during 1999 (data supplied by the UK Meteorological Office). The percentage of data points recorded was poor (36%), indicating that the recording station was out of operation for much of the time.

Figure 8-2 Hourly mean temperature by month, Ganja 1999



Long-term meteorological records for Yevlakh District show an average annual temperature of 14.6°C. January is the coldest month, averaging 1.7°C, whilst July is warmest, averaging 27.3°C. Table 8-1 shows long-term meteorological information for Yevlakh District (Budagov, 2002), indicating temperature fluctuations by calendar month.

Table 8-1 Long-term temperature data (°C), Yevlakh District

	Month												Annual Mean
	J	F	M	A	M	J	J	A	S	O	N	D	
Average temp.	1.7	3.7	7.6	13.5	19.6	24.3	27.3	26.6	21.7	15.6	9.0	3.9	14.6
Average absolute minimum temp.	-8	-7	-4	1	8	12	15	15	10	4	-3	-6	3.1

8.3.2.3 Soil temperature

The temperature of the soil is dependent on the nature of the soil surface, the amount of solar radiation incident on the area and the energy balances at the surface. Soil particle grain size, soil moisture content and degree of vegetation cover are all significant issues in relation to soil temperature.

Mean daily soil surface temperatures are around 2°C to 3°C higher than air temperatures. This reflects strong solar heating of the soil surface (especially in summer), the lack of a shading/transpiring vegetation cover, and a limited soil moisture supply for evaporation. Mean annual soil surface temperatures are relatively constant along the route, varying between 16°C and 18°C. Mean July soil temperature along the whole route varies between 30°C and 35°C. In January, mean soil surface temperatures along the entire route are between 0°C and 3°C, except near Puta where average values tend to exceed 3°C.

Potential evapotranspiration (PE) is strongly linked to temperature regimes. PE is the maximum amount of evaporation and transpiration that can take place if an unlimited moisture supply is available. PE rates in the April to October period are very high, at more than 800mm in eastern Azerbaijan and 600mm in the west. The summer evapotranspiration

peak is controlled by the amount of solar radiation received, wind speeds and atmospheric humidity, among other factors.

The fact that PE losses exceed precipitation inputs by some margin is largely responsible (along with soil salinity and overgrazing) for the sparse vegetation cover in the eastern part of the route. Irrigation systems are extensive in the central parts of the SCP corridor, and replenish evaporated and transpired soil moisture to sustain agricultural activity. Over-irrigation is, however, common in these areas, with high evaporation rates leading to a build up of saline deposits in the soil.

8.3.2.4 Humidity

Mean annual absolute humidity increases from around 11gcm⁻³ in the west to around 13 gcm⁻³ in the eastern coastal areas. Strong seasonality exists, however, and in the Shirvan Plain lowlands, values range from 4.0-7.2 gcm⁻³ in January, and 14.3-22.2 gcm⁻³ in August. Mean annual relative humidity displays little spatial variability, increasing from 67% at Shamkir (close to KP315) to 72% at Kurdamir (near KP110). Summers are hot and dry, and peak relative humidities are achieved in winter. The highest average daily humidity recorded along the route is 87% during the winter in Kurdamir, a value that declines to 72% in July.

8.3.3 Precipitation

8.3.3.1 Annual and seasonal precipitation

Average annual precipitation decreases steadily from around 350-400mm near the Georgian border to 104mm at Puta. Rainfall is the most strongly varying climatic parameter in the SCP corridor (Figure 8-3). The arid desert plain in the Puta/Sangachal region is one of the driest areas in Azerbaijan. Variability from year to year is high, as is common with semi-arid and arid environments, and Puta has received as much as 390mm in one year (1968), and as little as 78mm in another (1925). Similarly, annual totals at Akstafa (approximately KP357) have ranged from 567 to 253mm (Table 8-2). It should be stressed however, that the much greater precipitation (and snowmelt) over the Caucasus ranges controls the magnitude and seasonal variation of flows in the rivers crossed by the SCP (see Section 8.10 – Hydrology and water quality).

Table 8-2 Precipitation statistics for meteorological stations along the SCP route

Station	Total Rainfall for Year (mm)		
	Mean	Average Max	Average Min
Puta	104	390 (1968)	78 (1925)
Alyat	188	NA	NA
Kurdamir	325	551 (1963)	195 (1947)
Ganja	248	397 (1948)	150 (1932)
Akstafa	359	567 (1915)	253 (1925)

Note:

NA indicates data that are not available at the time of this report

Seasonal distribution of precipitation is not especially pronounced in the region, although there are some variations along the SCP corridor (Table 8-2). Two seasonal peaks in rainfall intensity are evident: one in the March-May period, and a second in autumn/winter. Most precipitation falls between September and April. The driest month is July, when the average rainfall is 8mm in Baku, 2mm in Puta, and 32mm in Akstafa.

Meteorological data gathered for Yevlakh District indicate low levels of precipitation due to the district's low-lying location. Long-term records show average annual precipitation of 323mm. On average, the months of July and August experience the lowest rainfall, approximately 15mm and 13mm respectively, whilst March and October experience the greatest average precipitation of 37mm and 34mm respectively. Long-term records indicate 78 rainy days per annum on average.

Figure 8-3 Mean annual precipitation map for Azerbaijan (Source: Agroclimate Atlas Of Azerbaijan, 1993)



8.3.3.2 Rainfall event magnitudes and frequencies

On average, rain falls on approximately 58 days a year in Baku, and 71 days in Kurdamir. The maximum daily precipitation along the route varies from 65mm in Baku to 100mm in Kazi-Magomed (KP52). These extreme events occur mostly in summer, but can also occur in winter, especially near the coast. Eyubov (1996) states that large daily rainfalls, in the 75-100mm range, may occur once every 100 years.

Rainstorms in semi-arid environments along the route are recorded, on average, approximately every 2-4 years. These events can lead to significant floods, associated erosion and substantial sediment loads in the channel networks, which may be dry or at low flow for most of the year (see Section 8.10, Hydrology and water quality). Heavy rainstorms may also trigger mudflows (see Section 8.6.4, Geohazards).

8.3.3.3 Snowfall and snowmelt

Precipitation along the route occurs almost entirely as rain: only 6 days of snow per annum on average are recorded at Baku and Kurdamir, increasing to 15-18 days near the Georgian border. However, heavy snow accumulations occur in the Greater and Lesser Caucasus mountains every winter, affecting the rivers crossed by the SCP. The snow in the mountains melts each spring, and rainstorms can augment snowmelt. The considerable quantities of meltwater generated through the snowmelt and mountain rainfall can cause significant flooding downstream in the pipeline zone.

Snow tends to disappear from the SCP route by the end of March at the latest. However, snow usually persists in the mountain river source areas until the end of May/early June, and a risk of flooding downstream at SCP river crossings usually remains until late June. Most annual meltwater floods begin in March, peak in April or May, and are over by the end of June.

8.3.4 Wind speed and directions

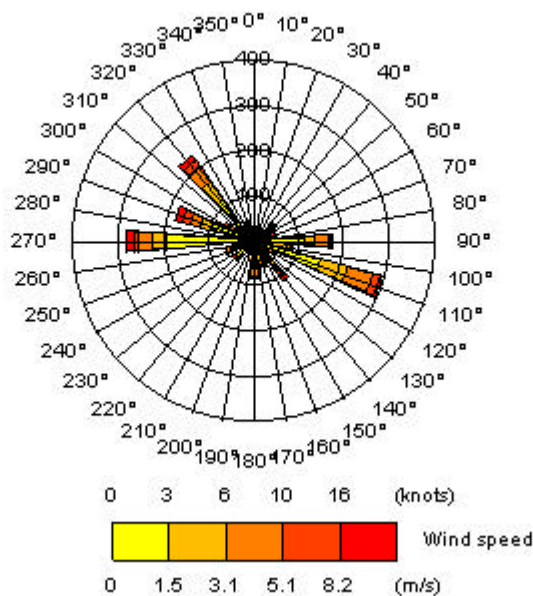
Mean annual wind speeds are very high near the eastern end of the SCP, decline toward the central part of the corridor and then rise again near the western end. Stronger winds are especially common in August. Very high wind velocities (greater than 25ms^{-1}) occur regularly throughout the Apsheron region. Dust-storm events are likely to occur in the Sangachal area, due to the occurrence of wind speeds in excess of 15ms^{-1} for over 100 days per year and the presence of local dry and fine surface materials.

Data for Yevlakh District indicate that 60% of the winds observed are from the north-west or south-east. According to long-term meteorological information, there is an average of 21 days per year with high wind velocities (exceeding 15ms^{-1}) in that region.

At the eastern end of the pipeline, northerly winds dominate (55% of the time), and can, in winter, bring sudden reductions in temperature and occasionally snow. Westerly winds become increasingly common towards the Georgian border, especially in winter.

Figure 8-4 is a windrose for Ganja obtained from 1999 monitoring data supplied by the UK Met Office. However, the percentage of data recorded was poor (36%), indicating that the recording station was out of operation for much of the time.

Figure 8-4 Windrose, Ganja 1999



8.3.5 Key issues

Key characteristics of the climate along the route of the pipeline in Azerbaijan are as follows:

- Hot dry windy summers predominate in the east, particularly in the Gobustan region
- Largely dry winters are experienced over the entire the pipeline route
- Hot, humid conditions with little wind prevail around Yevlakh near the centre of the pipeline route
- Cooler weather predominates in the west towards the Georgian border

8.4 AIR QUALITY

This section characterises the existing (baseline) air quality in the vicinity of the proposed pipeline route.

8.4.1 Baseline Air Quality Monitoring Survey

A baseline air quality sampling survey was undertaken in 2001 as part of the BTC project baseline surveys. The survey was carried out at KP 243.5, near the village of Yardili in central Azerbaijan. This location is considered to be representative of other rural locations along the proposed pipeline route. For the full report, including methodology, see the BTC ESIA, Air Quality (Pump Station) Report, Part 12, Baseline Reports, Appendix.

The survey was carried out at eight locations, over approximately five weeks, and measured concentrations ($\mu\text{g}/\text{m}^3$) of oxides of nitrogen (NO_x), sulphur dioxide (SO_2) and hydrocarbons (VOCs) using diffusion tubes.

An indication of levels of particulate matter was obtained by means of adhesive strip dust gauges.

8.4.2 Other Data Sources

Background data air quality data for the Sangachal area and the area around the WREP pump stations PS-5 and PS-8 were obtained from an air monitoring survey (AIOC Air Quality Survey 2000, R. Finney) undertaken in 2000 by BP. NO_2 , SO_2 and hydrocarbons were monitored using diffusion tubes. Air quality in the vicinity of Sangachal is considered to be typical of that in similar areas within the country.

8.4.3 Background Air Quality Data

Table 8-3 presents a summary of the results of the diffusion tube survey conducted near Yardili, previous data obtained for the Sangachal and the two WREP pump stations in Azerbaijan are also shown.

Table 8-3: Baseline Air Quality Data

Substance	Nr Yardili	Sangachal ⁽¹⁾	WREP PS-5 ^(2,3)	WREP PS-8 ^(2,4)
	concentration (mg/m^3)			
Oxides of nitrogen (total NO_x as NO_2)	6.5	2.8	6.0	8.7
Nitrogen dioxide	2.6	ND	ND	ND

Sulphur dioxide	3.4	3.5	4.4	4.3
Benzene	2.3	1.3	1.7	1.6
Toluene	4.7	1.7	ND	ND
Ethylbenzene	1.0	1.3	ND	ND
Xylene (all isomers)	2.5	1.3	ND	ND
Total hydrocarbons	109	54	50	43

⁽¹⁾ Average concentration for a number of locations in the vicinity of Sangachal town and Terminal

⁽²⁾ Average concentrations for four monitoring locations at each pump station.

⁽³⁾ WREP PS-5 is located at approximately KP 190 on the SCP route, near to the village of Shahliq.

⁽⁴⁾ WREP PS-8 is located at approximately KP 324 on the SCP route, near to the village of Karadjamirli.

ND – indicates non-determination.

The results from the baseline surveys near Yardili, Sangachal and the WREP pump stations (PS-5 and PS-8) show that the air quality in these areas is good. No pollutant concentrations approach the standards and guidelines discussed in section 10 of the ESIA. The results of these surveys are typical of the types of rural and urban areas encountered on the pipeline route.

8.4.4 Dust

The average result for particulate matter deposition near Yardili was 0.4% effective area covered per day. The supplier of the dust gauges used near Yardili has stated that an effective area covered per day of less than 2% particulate matter will not generally cause nuisance. Although dust levels measured by the sampling survey described above were low, much of the SCP pipeline will be in areas of clayey, silty or fine sandy soil. Under dry conditions such soil types are prone to result in dust emissions through physical disturbance of the soil surface (e.g. by wind erosion and vehicle movements on unpaved roads). Dust storms are a frequent occurrence, particularly on the eastern part of the route.

8.4.5 Key Issues

Key air quality issues in the context of the SCP pipeline are as follows:

- Air quality in the vicinity of Yardili, Shahliq village and Karadjamirli village and Sangachal is good; the baseline data gathered at these locations is considered to be typical of rural and urban locations along the SCP route
- Under dry conditions, the soil types present along the pipeline route are prone to generate dust when disturbed; dust storms are a frequent occurrence, particularly in the eastern part of the route

8.5 NOISE

8.5.1 Introduction

The SCP is routed almost entirely through quiet desert, semi-desert and rural areas where ambient noise levels, particularly at night, can be expected to be low or very low (typically less than 20dB(A) at night). However, background noise levels can be significantly higher during periods of strong winds, with levels typically in the range of 45-55dB(A).

8.5.2 Environmental noise surveys

Background noise surveys have already been undertaken by BP in the vicinity of the BTC project pump station and Sangachal Terminal. The annoyance produced by noise is dependent upon many complex interrelated factors such as 'loudness', frequency (or pitch) and any variations in level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors. In accordance with normal practice, the surveyors:

- Took measurements on the 'A' scale over a period of fifteen minutes using the 'fast' time weighting that is exceeded for 90% of the time interval sampled (referred to as ' L_{A90} , 15min'). The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the internationally recognised 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is heard by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dB(A) level
- Made detailed subjective observations to define the character of the ambient noises
- Filtered out intermittent noises close to the monitoring positions (from wind, rainfall, running water, fauna, unrepresentative traffic [road, rail, air], and from other man-made sources)
- Took measurements at night as well as during the day
- Sampled at noise sensitive points (eg, outside dwellings, etc)

8.5.2.1 BTC Pump station PS-A2 (KP244)

A background noise survey was undertaken at the proposed site of the BTC pump station PS-A2 in November 2001 (for full report see the BTC ESIA, Noise (Pump Station) Report, Part 13a, Baseline Reports Appendix). This location is typical of rural conditions in the central area of Azerbaijan, comprising a featureless plain with occasional trees and irrigation channels. A medium sized village (Yardili) and a refugee camp are close by and the Karabakh Canal runs to the west. Measurements were taken at eight locations during a four-day survey.

During the daytime period, measured minimum (L_{A90} , 15min) background levels at the monitoring locations ranged between 29 and 39dB(A). The noise environment was dominated by local activity, agricultural machinery and at positions close to roads, by individual traffic movements.

Measured night-time background noise levels (L_{A90} , 15min) during the survey period were in the range 22 to 35dB(A) at the monitoring locations. These background noise levels are considered to be typical of a rural/agricultural area during the night.

At one location, noise levels were entirely dominated by a neighbouring electricity sub-station which was in continuous operation day and night. At this location the minimum measured background noise level was 60dB(A).

8.5.2.2 Sangachal Terminal (KP0)

A background noise survey undertaken in 1996 in the Sangachal area, prior to the construction of the existing terminal facilities, revealed generally high noise levels (L_{A90} , 15min) of up to 55dB(A) (AIOC EOP EIA, 1996). The levels measured are considered typical of a windy coastal location near to road traffic in Azerbaijan, but may not represent the

existing noise environment as they pre-date construction of the terminal facilities. Conversely, as the measurements were taken during windy conditions they may be an over estimate of what conditions would be like in calmer weather.

8.5.3 Key issues

Key noise issues in the context of the SCP are as follows:

- The area surrounding the BTC project pump station is generally a quiet rural area, typical of the rural areas crossed by the SCP. Minimum background noise levels ($L_{A90, 15min}$) ranged mainly from 29 to 39dB(A) during the day and 22 to 35dB(A) during the night. However, much higher noise levels (60dB(A)) were recorded at one location due to the proximity of an electricity sub-station that was operating continuously
- Noise levels of up to 55dB(A) ($L_{A90, 15min}$) have been recorded at Sangachal and are considered typical of a windy coastal location near to road traffic

8.6 GEOLOGY

8.6.1 Introduction

The SCP route in Azerbaijan is located in a depression (the Kura River Valley) within the southern extension of the Great Caucasus mountain range. The formation of the Caucasus is associated with the Alpine-Himalayan orogenic belt, which originated due to the closure of the Tethyan ocean and the subsequent collision of the Eurasian continental plate with the African and Indian continental plates. The regional structure is dominated by compressional deformation of sedimentary rock, which led to the formation of nappes verging towards the south-east. There was some volcanic activity during this long period of compressional tectonism. Thrust faulting in the Late Miocene period lifted Jurassic and Cretaceous rocks over the Pliocene deposits of the Great Caucasus. Associated fault zones are located along the margins of this zone and have been a focal point for seismic events. Of particular importance are vertical faults orientated in a north-east/south-west direction which led to block faulting of the basement.

8.6.2 Stratigraphy

Relatively recent solid geology in the form of Cretaceous, Tertiary and Quaternary sedimentary rocks underlie the SCP route. These comprise predominantly sandstones, limestones and marls, with relatively minor sections underlain by metamorphic and igneous formations.

During the Quaternary, the Caucasus (especially the Greater Caucasus) experienced valley and mountain glaciation, resulting in moraines and fluvioglacial deposits. Thick alluvial/proluvial plains developed at the foot of the mountains, forming (for example) the inclined Ganja-Kazakh Piedmont Plain (Nalivkin 1960). Over most of the pipeline route a superficial Quaternary cover of varying thickness and character mantles the solid geology. These deposits mainly comprise alluvial materials, although fluvioglacial deposits and mud flows are also encountered.

Mudflows from mud volcanoes occur only in the Gobustan region in the eastern part of the pipeline route. In places they occur within the pipeline corridor (KP25-29 in particular). They form a layer of basic mud and possibly rock breccias up to 10m thick. In some areas the mud flows are susceptible to rapid rates of erosion. Outcrops of mainly Pliocene rocks (limestone, marl, argillites) are observed in this area of the pipeline route, however none are crossed by the pipeline.

Alluvial deposits predominate along the majority of the route between Kazi-Magomed and the Georgian border (KP52-442) and comprise clay to cobble sized sediments. Clays and finer grained sediments tend to predominate in the eastern sections of the route, tending to gravels and cobbles west of the Kura East River crossing (KP224) to the Georgian border. The extensive flatlands of the Shirvan and Karabakh Plains are still accreting due to the high sediment load of the rivers with catchment areas in the Greater Caucasus. This accretion is also a characteristic of the plain and lowlands of the Lesser Caucasus in the west. These flood plain deposits provide fertile soils and are the basis for intensive agriculture of these regions.

8.6.3 Economic geology

Every effort has been made during routing of the pipeline to avoid economic geology reserves. The pipeline is however, routed close to three areas where sand and gravel extraction occurs:

- Downstream (approx. 200m) from the Kura East River crossing (KP224) there is active sand and gravel dredging
- At the Shamkir River crossing gravel extraction is currently taking place at the crossing point and immediately downstream (KP332)
- Upstream (approx. 1km) of the Tovuz River crossing (KP377)

With the exception of the Shamkir River crossing, the scale of aggregate extraction in these areas appears to be limited, probably providing a source of aggregate for the local area. The extent of extraction at Shamkir is greater and is likely to be of regional importance.

Oil and gas exploration and production has taken place along certain sections of the route and some areas are still active concessions. However, although the route passes close to disused (and sometimes leaking) oil exploration or production wells, current production facilities have been avoided. This is discussed further in Section 8.9, Land Contamination.

8.6.4 Geohazards

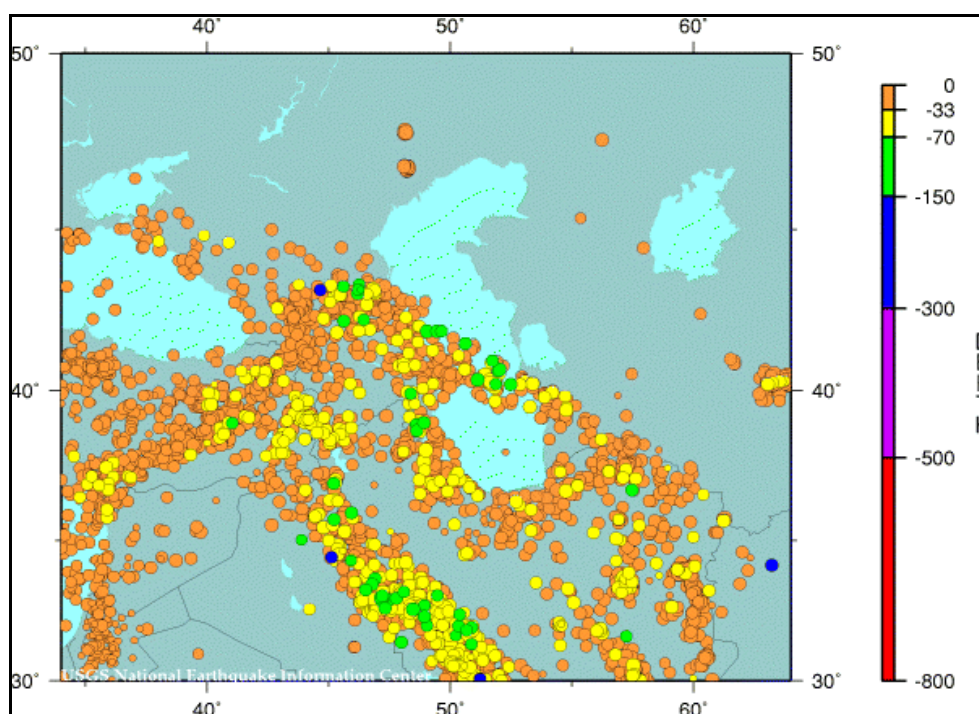
Geohazards are defined as geological phenomena or conditions, either natural or man-made, which are dangerous (or potentially dangerous) to the environment and its inhabitants. Natural hazards include earthquakes and volcanic eruptions. Ground subsidence due to mining is an example of an anthropogenic geohazard. There are a number of potential geohazards along the SCP route as discussed below. Geohazards related to river crossing (Hydrological characteristics and channel dynamics) are discussed in Section 8.10, Hydrology, and in more detail in the Geohazards Report, Part 7, Baseline Reports Appendix.

8.6.4.1 Seismicity and fault activity

Due to continuing tectonic plate convergence in the Caucasus Region, Azerbaijan experiences high levels of seismic activity (Figure 8-5). The identification of the level of seismicity of the region gives an indication of earthquake activity risk that will have consequences for the design, construction and operation of the SCP.

Three classes of seismic activity are generally recognised, namely tectonic, volcanic and artificially induced. The tectonic variety is by far the most devastating and is caused by the build up of stress due to movements of the plates that make up the earth's crust. The Caspian is located in a zone stretching from the Mediterranean to the Himalayas that is characterised by tectonic earthquakes. Although active geological structures are encountered at the eastern and western ends of the SCP route, the extensive Kura Valley region is generally not tectonically active.

Figure 8-5 Measured earthquake event distribution, 1973-2000



Seismicity along the SCP route

The SCP route crosses a seismically active area where earthquakes of up to 8 on the Richter scale occur. Data about the severity of earthquakes in Azerbaijan are usually given in Energy Classes (K), whereas Europeans are used to Magnitude (M_w). Both systems are comparable and describe the energy at the source of an earthquake. Intensity figures based on the Richter Scale cannot be directly compared as they relate to surface effects of an earthquake.

The highest densities of earthquakes in Azerbaijan occur north of the SCP route in the foothills of the Great Caucasus, where strong earthquakes have led to the destruction of complete cities in the past. High densities occur along the SCP route in a zone from Kazi-Magomed to 25km east of Kurdamir (KP52 to KP107) and for another 15km from Mingechaur to Goranboy (KP243 to KP258). Zones of medium density cover about one third of the length of the SCP and more than 200 epicentres can be identified as occurring within a 30km corridor along the route since 1962.

In the Kazi-Magomed region (where the pipeline crosses the Kazi-Magomed and Western Caspian Faults), earthquakes of moderate energy class are registered. Between Yevlakh and the Georgian border there is a fairly even distribution of epicentres, producing a zone of high tectonic and seismic activity.

Recent earthquakes in Azerbaijan

Two major earthquakes have occurred in the region within the last three years. The largest earthquake to occur within the SCP region in recent years took place on 25 November 2000, close to the Caspian. The magnitude of the earthquake was recorded as 6.3Mw, with an epicentre located in the vicinity of Baku. At least 27 people were killed and more than 400 were injured in the Baku area.

An earthquake was recorded on 4 June 1999 in the Eastern Caucasus region, with a magnitude of 5.5Mw. The epicentre was located in the Eastern Caucasus, over 50km to the north of the SCP area. Fifteen people were injured and approximately 50 houses damaged in the immediate area.

Fault identification

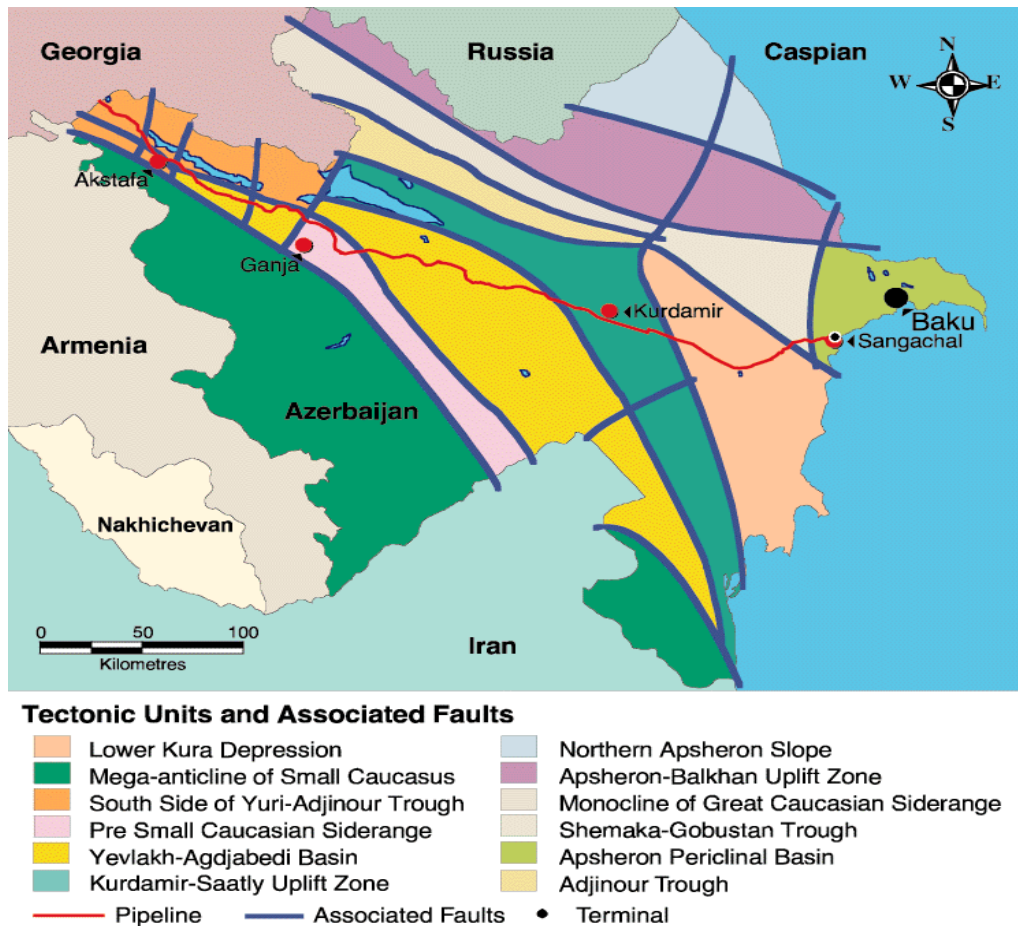
In terms of construction and operation of the pipeline and associated facilities, an important factor, which may affect integrity, is movement along zones of active faulting during an earthquake event. Once these areas have been defined, the pipeline and facilities can be located away from such areas, or if necessary, designed to accommodate any anticipated movement.

EQE International, on behalf of SCP Co, carried out a thorough investigation into seismic hazards presented by faults along the route. The main objectives of the work were to identify active faults, characterise them for engineering design purposes and carry out ground motion hazard assessments. Faults and tectonic units along the pipeline route are illustrated in Figure 8-6.

As mentioned, the Kura River Valley, is not prone to active tectonic faulting. At both the western and eastern ends of the route, the active geological fault zones of the Greater and Lesser Caucasus Mountains are encountered. In many fault zones, slope instability hazards coincide with active faulting, which suggests that the faulting is at least in part responsible for the presence of slope instabilities.

Study of aerial photographs, and subsequent field investigation indicated that the SCP will cross five active faults at the following locations: KP24, KP29, KP50-51(2 faults) and KP410-420.

Figure 8-6 Tectonic units and associated faults along the SCP



Solid liquefaction

Tremors produced during an earthquake can cause the pore-fluid pressure in a sediment or soil to increase to the point at which the particles can readily move with respect to each other, temporarily transforming the soil or sediment into a fluid mass. This phenomenon is known as liquefaction and may be triggered as a result of seismic activity. Preferential conditions for liquefaction occur in saturated soils when earthquake shaking or other rapid loading reduces the strength or stiffness of a soil. Earthquake shaking can often trigger this increase in water pressure, but this can also be caused in connection with construction related activities such as blasting.

In relation to the SCP route, this hazard is minimal, as most of the sediments are rich in clay, which is far less prone to liquefaction than well-sorted granular sediments such as sands. Well-sorted sands are present to a greater degree along the pipeline route between the Kura West River crossing (KP409) and the Georgian Border, which may cause this area to be more prone to liquefaction. However, during the field survey and review of aerial photographs no evidence of liquefaction was identified in Azerbaijan.

8.6.4.2 Mud volcanoes

Over 300 mud volcanoes are present in Azerbaijan, the majority of which are found in the Gobustan region (KP0-29). Their distribution is related to anticlines and they are orientated in chains along the axes of these folds and/or along the lines of larger faults, in a north-west to south-east orientation. They are formed at the points at which pressure within the earth's crust

(up to 6km deep) is released, and consist of hills with bubbling craters of cold mud, methane and water (Figure 8-7). Occasionally violent eruptions occur when mud and larger clasts of rock, liquids and gases erupt from the ground surface. Eruptions can be violent and unexpected, and the gases discharged may ignite. Mudflows form as the mud travels downslope away from its source. With time the erupted material will form a conical or plateau-like structure. Since mud volcanoes are geologically short-lived and tend to move along fault lines; the direction of migration of existing mud volcanoes along active ridges is also relevant to pipeline routing.

Figure 8-7 Mud Volcano



Only three mud volcanoes are considered to be close enough to the SCP route to have the potential to influence its construction or operation (see Figure 88 and Table 8-4). These features are as follows:

- Otman-Bozdag mud volcano, one of the largest in Azerbaijan, lies 4.6km to the north-west of the Sangachal Terminal. The Otman-Bozdag volcano is active, eruptions being registered in 1845, 1904, 1922, 1951, 1965 and 1994. Mudflows would have to reach lengths of 4.9km in order to affect the SCP. This is considered to be unlikely, even if an event of the maximum predicted magnitude were to occur
- The Turagay mud volcano (located approximately 2.5km to the south of the SCP route at KP 16) last erupted in 1955 and although not currently active, further eruptions are considered likely
- The structural-front mud volcano complex (Mud Volcano Ridge) is an elevated ridge of mud volcanoes, running north-west to south-east bounded by two active geological faults. It is crossed by the SCP route between KP24 and KP30. The main concern in this area is where the SCP crosses broad mud breccia fields where active mud volcanism is occurring. As mud volcanism is fracture-controlled in this region, there is the potential for the opening and/or shear of fresh fractures, which could damage

buried pipelines. Existing mud volcanoes in the Mud Volcano Ridge area have been avoided

Table 8-4 Proximity of mud volcanoes to the SCP route

Mud Volcano	Distance from pipeline route
Otman-Bozdag	4.9km
Turagay	2.5km
Mud Volcano Ridge	Crossed by route

Figure 8-8 Locations of mud volcanoes along the SCP route



In summary, mud volcanoes pose a potential risk to structures through ground rupturing and mud flows. Hazards include extrusion, subsidence and displacement along fissures and faults around the vent area. Mudflow tracks can be up to 100m wide and up to 12m thick (although less than 5m is more usual). Buried pipes may be subjected to hazards associated with loading.

8.6.4.3 Terrain geohazards

Badlands

Badlands are areas of highly dissected and easily eroded terrain. They are encountered at certain areas along the pipeline route where a combination of highly erodible, silty clay soils and steep slopes has led to severe erosion of the terrain. This is discussed in more detail in Section 8.8, Soils.

The SCP has been routed to minimise the distance traversed in the badlands.

Soil salinity

In many regions, the soil has a high salinity (discussed further in Section 8.8, Soils). Where soils are habitually wet, accelerated corrosion of subsurface structures such as pipelines may occur if adequate corrosion protection is not provided.

Sinkholes

Smaller scale terrain issues include the presence of sinkholes, which may result in an uneven bed for the SCP. These can occur at locations along the pipeline route where slopes are crossed within areas of poorly consolidated fine-grained soils, particularly badland areas (discussed further in Section 8.8, Soils).

Landslides and debris flows

Landslides and debris flows are caused by rainstorms, earthquakes, volcanic activity and various human activities and can seriously affect pipeline integrity. Evidence for these can be seen in the form of mass movement along slip planes. Every effort has been made to avoid areas prone to landslide and debris flows when routing the pipeline.

8.6.5 Key issues

Key issues in terms of geology and geohazards along the pipeline route are as follows:

- Relatively soft unconsolidated sediments that are likely to be easily excavated underlie the majority of the pipeline route
- Azerbaijan is situated in the seismically active Caucasus region and experiences frequent earthquakes; however, the pipeline route is situated mainly within the less seismically active Kura River plain
- The pipeline route crosses four seismically active fault zones
- The pipeline route crosses a ridge of active mud volcanoes

8.7 TOPOGRAPHY AND GEOMORPHOLOGY

8.7.1 Introduction

The topography and geomorphology along the pipeline route is characterised by distinct sections as described below (see Figure 8-9, Geographical Regions).

8.7.2 Gobustan region (KP0 - KP52)

The Gobustan area consists of plains and low mountains with elevations of up to 400m, for example the Turagay mud volcano. They are part of the tectonic structure of the Apsheron Basin and the Shemaka-Gobustan Trough. Erosion and denudation occur in the hilly areas with the subsequent creation of steep slopes, badlands, gorges, gullies and the local exposure of carbonaceous bedrock (although not along the route of the pipeline). Mud volcanoes are distinct features of this area and are described in detail in Section 8.6.

Figure 8-9 Geographical Regions along the SCP

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8.7.3 Shirvan Plain (KP52 - KP224)

The central part of the pipeline route consists of the vast Shirvan Plain. In this area Quaternary alluvial deposits from the Greater and Lesser Caucasus form huge fans, cones and terraces (Novocaspian formations). The topography is flat and altitudes are low, varying from -12 to +10 metres above mean sea level (mamsl). The sedimentary cover of the basement reaches more than 5,000m in thickness and is of Mesozoic and Cenozoic age. The Shirvan Plain is highly intersected by rivers sourced in the Greater Caucasus and by irrigation canals.

8.7.4 Karabakh Plain and Caucasus Plain (KP224 - KP442)

The western section of the pipeline route consists of the Karabakh Plain and the Caucasus Plain, which includes the foothills of the Lesser Caucasus. Altitudes on this section of the route range from 80m to 330m. The cover of Palaeogene to Miocene sediments reaches a maximum thickness of 2,000m to 3,000m. This section is characterised by Quaternary alluvial and proluvial deposits which are derived mainly from the Small Caucasus. North of the Kura River, the plain is fed by alluvium from the Greater Caucasus, the watershed being situated near Poylu at an altitude of 197m. Major braided rivers, derived from the Lesser Caucasus mountains, are crossed by the pipeline in this section.

8.7.5 Key issues

Key topographical and geomorphological features along the pipeline route are as follows:

- The majority of the route runs through the Kura Valley on the Shirvan and Karabakh Plains
- Topography is slightly more elevated and undulating in the east in the Gobustan region

8.8 SOILS

8.8.1 Introduction

The various soils found along the SCP route are described below, beginning at the eastern end of the route, near the Sangachal terminal.

8.8.2 Eastern section (KP0 to KP52)

Soils in this region generally comprise yellow brown silty and stony clays and loams with consistencies varying from soft and loose to slightly hard. The soil structure is generally fine to medium. The soil surface often has a platy structure 3mm to 5mm thick that serves as a partial barrier to infiltration and contributes to high soil aridity. The topsoil in the Gobustan desert region, in particular, is very thin and has an elevated salinity, supporting sparse, saline tolerant vegetation (Figure 8-10).

Figure 8-10 Gobustan Desert Region



8.8.3 Central section, including the Shirvan Plain (KP52 to KP224)

The soils found on the plains of the central area of the route are depositional soils that are generally pale coloured (light yellowish brown) loams with a composition including significant quantities of silt, clay or sand. To the west of Kurdamir (KP128), the soil characteristics undergo a marked change. Unless currently irrigated, the surface tends to be highly cracked, with high concentrations of salt deposits seen on the surface (Figure 8-11). Poor irrigation practice in the past has been the principal contributor to soil saliniation in this region.

Figure 8-11 Soil Salination in the Kurdamir Agricultural Region



8.8.4 Western section (KP224 to KP442)

Between the two crossings of the Kura River (KP224 - KP411) alluvial deposits are present, with soils typified by grey-brown silty, sandy and clayey loams. These soils often have a high gravel and cobble content. The vegetation encountered is mixed, varying from natural, uncultivated regions (which are generally grazed hills and slopes), to semi-natural and agricultural lands (generally flat areas and valley floors).

Erosion and deposition play major roles in soil formation in certain hillslope regions, so that in some regions gravel from upland areas covers soils lower on the slopes. The soils developed in this manner have little resistance to erosion, and when severely eroded lead to the landscapes classified as badlands (see Section 8.8.7). These are found particularly in a 20km section to the east of Ganja and on the approaches to the Hasansu River crossing.

At the western end of the route, from the Kura West River crossing (KP411) to the Georgian border (KP442), the soil is generally a light brown sandy or clayey loam. In the more easterly part of this section, the soils often comprise wet and waterlogged sands making up the Karayazi Wetland and aquifer (see Sections 8.10 and 8.12).

8.8.5 Occurrence of gypsum-rich soils

Gypsum (hydrated calcium sulphate) is often found both on and just below the soil surface. The resulting saline conditions (in both soil and groundwater) are highly aggressive towards steel and concrete in subsurface structures such as pipelines. Gypsum within soil can also lead to problems, since the dissolution of gypsum can result in ground collapse beneath foundations and pipes.

8.8.6 Soil stability and susceptibility to erosion

There are certain areas (termed ‘badlands’) along the route where the soils are unstable and highly susceptible to erosion and dissection. Water and wind erosion of soils in these areas has led to the creation of gully and ravine complexes in areas where even moderate relief is encountered (Figure 8-12). Movement of topsoil and subsoil during levelling and grading of the ROW and the excavation of subsoil during trenching will break up the soil structure. In such badland areas, this may lead to an increased likelihood of erosion of the topsoil and subsoil piles and from the ROW. This is likely to be a particular problem in the following areas:

- Parts of the Gobustan desert with significant slope, particularly the Mud Volcano Ridge (KP26-29)
- Badland areas (approximately 20km long) to the west of Ganja
- Approaches to the Hasansu river crossing (KP395.9-398)

These areas already have severe erosion and stability problems, which could be exacerbated by construction of the pipeline if not managed correctly.

Figure 8-12 Erodible soils on the Mud Volcano Ridge



8.8.7 Potential for dust/silt generation

The majority of soils underlying the route are prone to dust generation during dry conditions; even light traffic may generate considerable quantities of dust. Silt generation is likely along the majority of the route since desiccation of the soil tends to increase the likelihood of silt and fine sand being incorporated into surface water flow.

8.8.8 Key issues

Key factors that may affect construction and operation of the pipeline are:

- Many of the soils encountered along the SCP route exhibit high levels of salinity, which can contribute to accelerated corrosion of both steel and concrete
- The soils with high clay and silt content are particularly prone to erosion and compaction

8.9 LAND CONTAMINATION

8.9.1 Introduction

This Section summarises the land contamination issues that may affect the project and describes those areas of known contamination that may be traversed by the pipeline. It should be noted that this section is based on information available at the time of writing this ESIA (i.e. prior to BTC pipeline construction). BP have committed to clearing areas of contamination prior to construction of the BTC pipeline. Therefore there should be no surface contamination along the SCP route once construction is due to take place.

Land contamination can affect surface and ground waters if a suitable pathway exists from land to water. The main focus of this Section, however, is land contamination since existing surface and ground water quality are discussed in Section 8.10, Hydrology and Section 8.11, Hydrogeology.

8.9.2 Potential contaminants

On the basis of work done to date and experience gained during construction of the WREP, the most likely potential contaminants that may be encountered on the pipeline route have been identified and are summarised in Table 8-5. Other contaminants that are less likely to be encountered are summarised in Table 8-6.

Table 8-5 Contaminants most likely to be present along pipeline route

Contaminant	Typical Sources	Characteristics
Petroleum hydrocarbons	Fuel storage, exploration/production activities, pipelines, railways, waste disposal (including fly tipping)	Most toxic constituents are typically also the most mobile. Majority of the compounds will biodegrade. Direct toxicity risks associated with inhalation of volatile components. Health risks associated with ingestion and dermal contact. Some constituents (such as benzene) are suspected human carcinogens.
Heavy metals (particularly chromium, mercury and lead)	Industrial activities and waste disposal (including fly tipping)	Often persistent in soil. Some salts have relatively high solubility. Typically less mobile in alkaline conditions. May be toxic to humans, animals and plants. Principle exposure through inhalation and ingestion.
Asbestos	Industrial activities (gaskets, lagging, filters, break pads), waste	Usually white, grey/blue or brown fibrous material. Carcinogenic and respiratory risks to humans through inhalation.

Contaminant	Typical Sources	Characteristics
	disposal (including fly tipping)	Mobility (and therefore exposure risks) limited by surface coatings and damp conditions.
Polycyclic aromatic hydrocarbons (PAHs)	Oil production, incinerators and fires, timber preservatives, tars	Often persistent in soils. Generally exhibit low solubility and are at best semi-volatile. Potential human carcinogens (especially benzo[b]fluoranthene and Benzo[a]pyrene). Most common exposure routes are through ingestion and inhalation. Dermal contact may also pose risks.

Table 8-6 Other potential contaminants that may be present along pipeline route

Contaminant	Typical Sources	Characteristics
Radioactive materials	Military activities, oil exploration and production (radionuclides may be released by operations such as drilling wells, oil collection, produced water disposal and oil storage)	May be encountered in a wide variety of forms and materials. Potentially carcinogenic and mutagenic.
Chlorinated solvents (TCE, PCE, TCA etc)	Industrial activities (degreasants, chemical plants)	Typically colourless volatile liquids with a density greater than water. Mobile in the environment, but with relatively low solubility in water. Potential mutagens and in some cases directly toxic. Exposure via inhalation, ingestion or dermal contact.
Pesticides & herbicides	Agricultural activities	Various. Typically persistent in soil. Potentially carcinogenic and mutagenic.
Polychlorinated biphenyls (PCBs)	Electrical switchgear, waste disposal	Often persistent in soil. Suspected carcinogens in humans. Principal risks associated with inhalation or ingestion and, to a lesser extent, dermal contact.
Dioxins	Incinerators, waste disposal	Usually encountered in ash from fires or incinerators that included chlorinated materials in the fuelstock. Potentially carcinogenic at very low concentrations. Persistent in soil. Typical exposure via ingestion or inhalation.
Biological hazards	Sewage, animal carcasses, tanneries, occasionally soil	Various. Possible pathogens in soil include anthrax, foot and mouth and tetanus.

8.9.3 Potential sources of contamination

8.9.3.1 Settlements & industry

In the majority of settlements, central sewage collection and treatment facilities are absent. The situation is aggravated during periods of high precipitation, when contamination of surface and groundwater bodies by sewage, domestic and industrial wastes regularly occurs. This is a particular problem in the area between Kazi-Magomed and Yevlakh.

Secondary contamination related to industrial activities carried out along the pipeline corridor in Azerbaijan is likely to be limited to the larger towns. Outside of these areas, the route principally passes through agricultural areas where the potential for substantial contamination as a result of industrial (farming) related activities is small.

In the Shirvan Steppe section of the pipeline, Kazi Magomed and Ucar are small industrial towns where printing, brick making and cotton processing takes place. There are also oil storage bases here. The principal contaminants that may be associated with such activities are hydrocarbons, solvents, dyes and agricultural chemicals. The pipeline corridor is located 1km to the north of Kazi Magomed and 5km south of Ucar.

The Karabakh Plain area traversed by the pipeline route has the potential for contamination mainly due to the industrialisation at Yevlakh. The industry at Yevlakh includes concrete and ferro-concrete production, asphalt production, wool processing and oil storage facilities. The pipeline corridor is located 1km south-west of Yevlakh.

The town of Ganja has a high level of industrial activity including concrete production, aluminium oxide production, machinery manufacturing, non-ferrous metal production, instrument engineering, wood processing, furniture manufacture and oil storage facilities. The aluminium oxide and non-ferrous metal production work is likely to have generated a mixture of heavy metals and fluorides in any shallow groundwater. Instrument manufacture may have involved contaminative materials such as radionuclides (fluorescent paints) and mercury. The other industries would be expected to generate a range of organic compounds (including chlorinated solvents). The pipeline corridor is located approximately 8km north of the outskirts of Ganja.

The towns of Tovuz, Kazakh and Akstafa also have oil bases and light industry such as wine distilleries and bread baking. These industries could potentially cause soil and groundwater contamination by a variety of materials including metals, hydrocarbons and agricultural chemicals.

Given the distances between the settlements/industrial areas and the pipeline route, it is unlikely that the route will have been directly impacted by the industries based in the towns. The most significant risks are therefore likely to be associated with inappropriate disposal of waste materials from the urban areas on the route.

The pipeline traverses the Borsunlu, Dalimammedli, Giragkasaman, Dallar-Tovuz, Khatunli and Akstafa oilfields, some of which are in operation. Only local contamination around the drill sites is apparent within these fields, however the potential exists for the presence of soil and groundwater contamination throughout the area.

8.9.3.2 Agricultural activities

The soils of the Gobustan region east of Kazi Magomed are too dry and saline to be used for extensive agricultural purposes. The majority of the remainder of the route passes through areas that are used, to a greater or lesser extent, for agricultural purposes. All such areas have the potential for soil contamination by agricultural chemicals such as pesticides and herbicides. In particular, soils throughout the Karabakh Plain area are reportedly contaminated with pesticides and herbicides.

8.9.3.3 Military areas/ordnance

All former and current military installations on the pipeline route have the potential for significant soil and groundwater contamination issues. In most cases these issues will principally relate to localised hydrocarbon contamination due to poor storage practices, however, a significant minority of sites may be contaminated by hazardous wastes and/or ordnance. Potential contaminants include radionuclides, organic compounds and explosives.

In the Gobustan region, the pipeline crosses a military area between KP5 and KP13. This area was apparently used for military training purposes and is reputed to contain anti-personnel mines. Other forms of live ordnance may also be present.

In the Karabakh Plain area the pipeline route crosses the Amirax oil prospecting area that was reportedly damaged by bombing during the conflict with Armenia. As a result the area may exhibit local crude oil contamination and the presence of live ordnance is a possibility.

In the Lesser Caucasus Plain and Lowland area, there is a military training area north of the Kura West river crossing at Poylu, extending westwards to Jandari Lake and the Georgian Border. The presence of ordnance (and possibly radioactive materials) in this area may be significant. However, given the location of the route it is unlikely to directly affect construction of the pipeline.

8.9.3.4 Existing pipelines and infrastructure

Given the poor construction practices and maintenance procedures historically employed in the Soviet Union, it is likely that many of the transmission pipelines crossed along the route will be in a poor state of repair. Two principal issues arise from this situation, as follows:

- The potential exists for losses from older pipelines to result in contamination of the soil and groundwater to an extent which results in impacts on construction of a new pipeline
- Catastrophic failure of existing pipelines may compromise the functioning of either the new pipeline or its associated infrastructure. This is particularly the case with respect to failures of natural gas lines which may lead to combustion of the gas at the ground surface. We understand that such incidents have been reported in both Georgia and Azerbaijan in recent years

It should also be noted that leaking oil pipelines are known to have caused contamination of the WREP corridor in two places in the Gobustan area.

Railway lines and sidings are frequently associated with localised soil and groundwater contamination. Typical contaminants include:

- Hydrocarbons (from fuel and lubricant spillages)
- PCBs (from electrical switchgear and transformers)
- PAHs, phenolic compounds, copper, chrome and arsenic (from wood preservatives)
- Asbestos (from brake linings, gaskets and fire prevention materials)
- Herbicides (from line clearance activities)

The potential exists for any or all of these contaminants to be present at railway crossings and pipe yards adopted for the project.

8.9.4 Natural contamination

8.9.4.1 Hydrocarbons

In the Gobustan area between KP0 and KP29, natural seepages of crude oil occur in small quantities from mud volcanoes and faults. As a result, elevated concentrations of hydrocarbons, metals and phenols from natural sources (mudflow and seepage) may be present in the vicinity of the pipeline.

8.9.4.2 Radioactivity

Mamedov (1996) indicated that the Gobustan region has a general background radiation level of between 4 and 15 μrhr^{-1} . However, in areas of intense tectonic and mud volcano activity, the background levels become elevated to 20-22 μrhr^{-1} . These levels are considered to be within 'normal' background radiation levels of <33 μrhr^{-1} (2.5mZvyr⁻¹) according to the established standard (NRPB 76/87).

The background radiation level in the Shirvan Steppe area is lower than in Gobustan, at between 5-8 μrhr^{-1} , due to the less active tectonic regime. There is still the potential for elevated levels of radiation to be released during hydrocarbon operations.

In the Karabakh plain area the background radiation level is low and stable at 5.5-6 μrhr^{-1} due to the less active tectonic regime. Hydrocarbon operations could also have released elevated levels of hydrocarbons, phenols, heavy metals and radionuclides.

The background radiation level in the Lesser Caucasus plain and lowlands area is believed to be relatively low and stable (around 6 μrhr^{-1}), although the area has not been as intensively surveyed as the eastern areas traversed by the pipeline corridor.

8.9.4.3 Biological hazards

Anthrax is known to be present along the route. The disease occurs most commonly in wild and domestic vertebrates (sheep, cattle, goats, camels and other herbivores). Transmission occurs by inhalation, ingestion or through the skin. Spores can survive in the soil for many years, and can result in infection of humans who are involved in handling products from infected animals or contaminated soil.

Anthrax occurrences in humans in Azerbaijan between 1992 and 1996 are indicated in Table 8-7.

Table 8-7 Anthrax cases in Azerbaijan

Year	Number of cases of human Anthrax
1992	33
1993	55
1994	50
1995	45
1996	76

8.9.5 Field observations of soil contamination

Table 8-8 outlines the findings of field work carried out during 2000 and 2001. This work identified twenty three sites of observed soil contamination close to the proposed route of the SCP (see Figure 8-13).

Table 8-8 Observed contamination along the SCP route

Nearest KP	Contamination Source	Potential Contaminants	Apparent Depth	Proximity to Pipeline centreline (m)
0	Oil industry	Hydrocarbons	Surface	600
51	Fly tipping/asbestos tiles	Mixed wastes	Surface	Within 20
52	Fly tipping	Mixed wastes	Surface	120
55	Oil industry - old oil exploration site with degraded oil, separation ponds and cuttings	Hydrocarbons	Unknown	70
64	Other Industrial (proposed camp/pipe dump site). White fibrous deposit in patches	Unknown, possible asbestos	Surface	500
77	Oil industry - old well site	Hydrocarbons	Unknown	Within 20
92	Oil industry – probable former oil exploration site with iron rich water in ponds	Heavy metal/iron	Unknown	40
223	Vehicle oil 4m from East bank of Kura in waterlogged ground	Hydrocarbons	Unknown	Within 20
224	Fly tipping/asbestos tiles	Asbestos tiles	Surface	400
227	Municipal	Household waste	Surface	40
231	Oil industry	Hydrocarbons	Unknown	300
254	Fly tipping - possible asbestos tiles plus household waste, paint cans, oil cans	Asbestos	Surface	50
271	Oil industry - disused oil well. Actively leaking oil and water into 3 lagoons around wellhead	Hydrocarbons	Unknown	40
276	Oil industry pumping station	Possible hydrocarbons	Surface	80
304	Fly tipping/asbestos tiles. Close to river, stream and earth dam	Asbestos tiles	Surface	Within 20
308	Industrial activities and fly tipping - possible smelting site-building rubble	Metals, hydrocarbons, mixed wastes	Unknown	Within 20
338	Fly tipping - possible asbestos tiles	Asbestos	Surface	20
343	Fly tipping - possible asbestos tiles	Asbestos	Surface	Within 20
354	Fly tipping	Asbestos tiles	Surface	60

Nearest KP	Contamination Source	Potential Contaminants	Apparent Depth	Proximity to Pipeline centreline (m)
364	Fly tipping including possible asbestos tiles, rubble, car remains, wire, cans	Asbestos, mixed wastes, solvents, metals	Surface	40
377	Fly tipping - possible asbestos tiles	Asbestos	Surface	60
395	Building rubble and fly tipping with possible asbestos tiles.	Asbestos	Surface	30
422	Fly tipping - barbed wire, metal, glass (chemical) bottles, tiles (possibly asbestos) on East bank of Kurudera River	Asbestos, mixed wastes, solvents, hydrocarbons, metals	Unknown	Within 20

In the majority of instances, the observed contamination was the result of uncontrolled disposal of wastes (fly tipping). Due to the uncertainty of their sources, and therefore their composition, fly tipped materials have the potential to present particular challenges to the project. In some cases it may be necessary to undertake a programme of sampling and laboratory analysis to determine the constituents of the material in order to quantify the risks that it may pose to the project.

The presence of hydrocarbon contamination at various points along the pipeline route may also pose health and safety and waste disposal issues, particularly during the construction phase of the project. In some cases it may be appropriate to undertake a programme of soil and groundwater sampling in areas of observed contamination in advance of the commencement of the construction phase of the project.

8.9.6 Field sampling programme at pipe yards and camps

A survey of the potential pipe dumps and camp locations was undertaken in September 2001. One camp and eleven pipe dump locations were surveyed. Samples of surface soil material were collected for laboratory analysis. These results were compared to internationally recognised standards. In general terms the levels of contamination identified were low. Levels of nickel, arsenic, mercury and crysotile (white asbestos) were found to be locally slightly elevated over the UK Government Interdepartmental Committee for the Redevelopment of Contaminated Land (ICRCL) guidelines.

8.9.7 Key issues

The principal key issues with respect to the SCP project and land contamination are as follows:

- Contamination will be cleared by BP prior to construction of the BTC pipeline, therefore eliminating contamination along the SCP route also
- Risks to worker health and safety, particularly during construction
- The difficulties associated with the safe management, remediation and disposal of contaminated soil or groundwater
- Confusion as to the source of contamination along the pipeline route (eg, the potential for the SCP project to be wrongly assumed to be responsible for contamination that in fact pre-dates the project)
- Contamination of land due to project construction and operational activities

Figure 8-13 Contaminated Areas along the SCP Route

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8.10 HYDROLOGY AND WATER QUALITY

8.10.1 Introduction

A study of the hydrology of the area traversed by the SCP was undertaken for the purposes of this ESIA. The study identified and characterised the main rivers, lakes, reservoirs and canals along the SCP route and assessed their generic hydrological characteristics and the existing sources of pollution.

8.10.2 Outline of the key hydrological features

Water resources are scarce and valuable along the majority of the SCP route. The main uses are for potable supplies, power generation, industrial operations, irrigation systems, domestic activities and cattle watering (Aliev, 1995), especially towards the western end of the route. The following rivers, crossed by the route, provide large quantities of water for drinking:

- Kura
- Aksu
- Geokchay
- Ganjachay
- Zayamchay
- Shamkirchay
- Tovuschay

The largest and most regionally significant hydrological features crossed or approached by the SCP in Azerbaijan are as follows:

- The main stem of the Kura River system, which runs close by the route in the west, and is crossed by the SCP twice (KP222 and KP411)
- Large Kura tributary rivers draining the Great Caucasus and Lesser Caucasus Mountains
- Mingechaur Reservoir and dam
- Shamkir Reservoir and reserve
- Karayazi Wetland near the Georgian border
- Canal and pipe networks supplying drinking or irrigation water
- The dry Gobustan area in the east, with flash flooding in wadis and rivers
- Jandari Lake (which straddles the Azerbaijan-Georgian border)

The locations and courses of the rivers and other hydrological features along the pipeline route in Azerbaijan are illustrated in Figure 8.14.

Clear hydrological differences exist along the route from east to west. In the west:

- River flow seasonality is slightly more pronounced
- The seasonal river flow peak tends to arrive earlier (May rather than June)
- Suspended sediment concentrations, turbidity, pH and TDS values are lower

On the basis of these parameters, four distinct hydrological regions along the SCP route are identifiable:

- At its easterly end between Sangachal and Pirsagat, the route passes through very dry territory and over a number of semi-arid channel systems, including two main rivers (the Djeyranchekmes and Pirsagat) and many ephemeral ravines, gullies and wadis which may experience flash floods
- Further inland the line crosses the less arid Kura River lowland and four left-bank tributaries of the Kura River sourced in the Great Caucasus, before it crosses the Kura River for the first time (Kura East river crossing)
- To the west of the Kura East river crossing, the route crosses seven sizeable, high-energy, right-bank, Lesser Caucasus tributaries
- Finally, the route re-crosses the Kura River (Kura West river crossing) at Polyu and passes close to the important Karayazi Wetland

8.10.3 Main watercourses crossed by the pipeline route

A major part of the hydrological assessment for the baseline survey was to identify the main watercourses and water features in the vicinity of the SCP and their specific characteristics that may interact with the SCP project.

The SCP route crosses 20 significant watercourses from the Sangachal Terminal (KP0) near the Caspian to the Azeri/Georgian border (KP442), (Table 8-9, Figure 8-14 and Volume 2, Environmental Route Maps). The route also crosses numerous streams, wadis, canals, drainage ditches and irrigation systems in various states of repair. Table 8-9 outlines the key characteristics of each watercourse crossed (including the ecological value). Information has been taken from a River Corridor Survey, undertaken in November 2001, for each main river crossed by the pipeline (the full survey is reproduced as Part 5 of the Baseline Reports Appendix.).

Table 8-9 River systems crossed by the SCP

River	KP	Main Features
Djeyranchekmes River	9.3	20m wide wadi which is often dry. Poor bank stability. Liable to flash flooding during periods of heavy rain. High sediment load during periods of flow.
Pisgarat River	42.1	Narrow canalised river with slow flow. High sediment load.
Girdmanchay River/ Agsu Canal	111.2	Wide canalised river – approx. 20m. Flowing water with high sediment load. Flow would take any contaminant downstream rapidly.
Geokchay River	171.3	Narrow canalised river in deep cutting. Vegetation indicates wide fluctuations in water level. High sediment load. Flow would take any contaminant downstream rapidly.
Turianchay River	193.5	Narrow canalised river in deep cutting. Vegetation indicates wide fluctuations in water level. High sediment load. Flow would take any contaminant downstream rapidly.
Kura River (east crossing)	223.6	Wide (200m approx) fast flowing major river with extensive fishing and wildlife value. Sand and gravel extraction 200m downstream. Any contaminant would be transported rapidly downstream.
Karabach Canal	245.1	Fast flowing, concrete lined major irrigation canal, approx 20m wide Any contaminant would be carried rapidly downstream.
Goranchay River	257.8	Small and often dry.
Kurekchay River	276.5	Wide braided gravel and cobble dominated channel with seasonal flow. River well used by villagers for washing, etc. Livestock use.

River	KP	Main Features
Korchay River	292	Wide, dammed valley (both upstream and downstream) with braided, narrow (2m) flowing channel within extensive area of marshy reed. Ecologically diverse. Spread of any contaminant would be partially impeded by the reeds but could have significant local effects. Livestock use.
Ganjachay River	296	Deeply incised channel of variable width (approx. 15m) but negligible flow. Dammed approx. 300m downstream from pipeline crossing. Dam would probably retain contaminant provided that abstraction could be stopped.
Sarysu River	316.1	Small stream with good species diversity.
Gashgarachay River	316.7	Fast flowing, approx. 3m wide, with good species diversity. Livestock use.
Karasu River	320.9	Narrow watercourse within a wide channel, mainly vegetated by reeds. Valuable bird habitat but relatively low risk of a contaminant spreading because of the reeds.
Shamkirchay River	332	Wide (approx. 150m) braided channel composed largely of gravel and cobbles. Dry for most of the year, but liable to flash flooding. Extensive gravel extraction from dry river bed.
Zayamchay River	357	Wide (approx. 150m) braided channel composed largely of gravel and cobbles. Seasonal flow. Archaeology (ancient bridge supports) within dry area of channel.
Tovuzchay River	377.1	Wide (approx 100m) cobble riverbed with narrow flowing channel. Seasonal flow, which may introduce the risk of any contaminant travelling downstream.
Hasansu River	397.8	Fast flowing, clear 'mountain' stream within deeply incised steep vegetated valley. Ecological diverse and valuable habitat. Sediment or contaminant release would have adverse impacts and could be carried considerable distance downstream.
Kura River (west crossing)	411	Major river - fast flowing and wide (approx. 300m) braided channel composed largely of gravel and cobbles. Extensive fishing. Any contaminant would be carried rapidly downstream to the Shamkir and Mingechaur Reservoirs.

Downstream sensitivities such as reserves and water resources from each of the main watercourse crossings are discussed in Section 10.4, Unplanned events.

8.10.4 The Kura River system

The Kura is the largest river system of the Caucasian region, crossing Turkey, Georgia and Azerbaijan. Its tributaries are sourced by high altitude precipitation, at elevations of between 1,900m and 3,600m, from the Great Caucasus (1,000mm per year precipitation to left bank tributaries) and Small Caucasus (800mm per year to right bank tributaries). The great majority of the water courses crossed by the pipeline route are elements of the Kura River system (ie, the Kura River itself or a tributary of it).

Figure 8-14 River Crossings along the Pipeline Route

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The Kura River is the most important water resource in Azerbaijan, both for human use and habitat provision, and includes sturgeon fisheries (Dames & Moore, 2000b). The Kura River flows into Azerbaijan upstream of Polyu, and then enters the Shamkir and Mingechaur Reservoirs; the outflow river crosses the Kura lowlands and discharges into the Caspian. The Kura River has a strongly seasonal snowmelt-driven regime, with the main flow period concentrated between March and June and an April peak. Mingechaur and Shamkir Reservoirs have a substantial regulatory effect on the flow of the Kura River and also serve to remove substantial volumes of sediment from the river flow.

The Kura River itself is crossed twice by the SCP route: first at Yevlakh (KP223.5), upstream of important sturgeon breeding areas and secondly at Polyu (KP411), upstream of the important Shamkir and Mingechaur Reservoirs.

The river at the proposed Kura River East crossing has experienced bank erosion problems linked to its erodible sediments, with bank stabilisation works evident (Dames & Moore, 2000). Though flow is regulated by the Mingechaur reservoir, Lawler (1997) identified the persistence of significant seasonal discharge fluctuations. The crossing point of the Kura River at KP223.5 is illustrated in Figure 8-15.

Figure 8-15 Kura East River Crossing



The Kura River West crossing is upstream of the key Mingechaur and Shamkir Reservoirs. These reservoirs are of vital significance to the water supply and habitats of Azerbaijan. River discharges can be very high and highly variable seasonally. The river is very active erosionally. Gravel mining activities are compounding scour and bank erosion effects (Dames & Moore, 2000). The site is also complicated by a number of existing road, rail and pipeline crossings.

8.10.5 Main Kura tributaries crossed by the SCP route

Many of the tributaries of the Kura River are high-energy, laterally-active, erosive mountain rivers. The rivers in the east flow south-west from the Great Caucasus; and where they are crossed by the pipeline, are dominated by finer grained silts and clays. The Turianchay river is the most powerful of these. In the west, the rivers flow north-east from the Lesser Caucasus mountains and, being closer to their source where they are crossed by the pipeline, are generally dominated by braided gravel and cobble rich channels. The Shamkirchay, Zayamchay and Tovuzchay are typical of such rivers. Most Greater and Lesser Caucasus rivers have floods generated by snowmelt in spring/early summer and by rainstorms in the autumn. Rainstorm-generated floods can last up to 15 days.

The Kura River tributaries in the wetter Great Caucasus have higher average, maximum and minimum discharges at the gauging stations than the Lesser Caucasus rivers. Many of the Lesser Caucasus tributaries have highly seasonal flow, and due to uses for irrigation upstream, often exhibit low or no flow for much of the year.

8.10.6 Other key rivers and waterbodies

8.10.6.1 Djerankechmes

The Djeyrankechmes is a 20m wide wadi, which is often dry, incised into the Gobustan desert, flowing through the Gobustan Cultural Reserve for approximately 1km south of the pipeline crossing point. It drains into the Caspian approximately 8km downstream at Sangachal and is crossed by the pipeline at KP8.9. It exhibits poor bank stability and is liable to flash flooding during periods of heavy rain. During periods of flow, it has a high sediment load.

8.10.6.2 Canals

Numerous canals are crossed by the pipeline, particularly between Kurdamir and Yevlakh, where they are used extensively for irrigation purposes. Many of the canals are in disrepair. The main canal crossed by the pipeline is the Karabakh Canal (KP245). The Karabakh Canal, which recharges from the Kura River at the Mingechaur Reservoir (Figure 816), carries significant amounts of water for many important uses including irrigation and industrial supply.

Figure 8-16 Karabakh canal



8.10.7 Water quality

Water quality data are important in a pipeline ESIA (Lawler *et al.*, 1996) because: mobile sediment can abrade pipelines; high sediment transport rates can indicate problems of channel or hillslope instability; river water of a particular quality may be required for hydrotesting or test-water disposal; water quality data provide baseline information against which to assess impact of effluent disposal from pipeline construction, testing or operation; and water quality is important for habitat quality for freshwater biota (eg, Aliev, 1990; Berdichevskaya *et al.*, 1991; Kownacki, 1985).

River temperatures vary seasonally from around 2°C to 7°C in winter (January/February) to 17°C to 25°C in summer (mainly August). Average suspended sediment concentrations (SSC) and loads (SSL) are high by world standards, and are comparable to those of other glacial/snowmelt rivers (eg, Iceland: Lawler and Wright, 1999). Mean annual SSC values for the Great Caucasus rivers are ten times those of the Lesser Caucasus systems, the highest being for Girdemanchay River (5,220mg l⁻¹), which flows into the Aksu Canal, and Geokchay River (4,810mg l⁻¹). Suspended sediment transport is highly seasonal, with peak fluxes in the high-flow period between March and June. The Great Caucasus rivers also deliver the higher suspended sediment loads: Geokchay River is the highest, with a peak monthly SSL of 184kgs⁻¹ in May. Mingechaur Reservoir, built in 1953, has rapidly silted up (capacity in 1953 = 16km³; 1982 = 14.5km³). It removes approximately 70% of the sediment discharge from the Kura River (Selivanov, 1996).

High sediment transport rates relate to high soil erosion rates driven by steep slopes, intense rainstorms, seasonally concentrated snowmelt-generated river flows, flash floods, limited vegetation cover and fine, erodible soils. Sediment supplies appear to be generated by mountain landslides, gulying, bank erosion, deformation of upstream channels, and occasional mudflows and sheetwash events. Erodible soil is a key issue. For Great Caucasus soils, average scouring velocities required for a flow 2cm deep are only 0.20 - 0.24ms⁻¹ (Kuznetsov *et al.*, 1998).

Total dissolved solids concentration (TDS) values tend to be higher for the Great Caucasus rivers (mean TDS values: 274 – 1,812mg l⁻¹). This may reflect slower runoff in the lowland reaches, greater solute acquisition opportunities, and contributions from solute-rich agricultural runoff. There is also a switch in river chemistry from hydrocarbonate and carbonate chemistry in the west to sulphate-dominated chemistry in the east. Water quality

snapshot reconnaissance surveys of November/December 1996 by Lawler (1997) and in August 2000 by ERM, confirmed the east-west patterns of SSC and TDS identified in the average data above. They also revealed that river waters were alkaline (pH values 7.82 - 7.20). The easterly Great Caucasus rivers tend to have a lower water quality, ie, higher TDS, turbidity and pH values.

Very limited data are available with respect to baseline pollutant levels in the Azerbaijan water bodies crossed or approached by the SCP. However, many water bodies in neighbouring Caucasus and FSU republics suffer from significant problems with highly persistent pesticides (eg, DDT), nutrients and eutrophication, heavy metals, hydrocarbon contamination, and toxic defoliant used in the production of cotton. It is likely therefore that at least some water resources in Azerbaijan will be affected by measurable concentrations of these pollutants. Aliev considers the waters of the Kura River downstream of Mingechaur Reservoir to be polluted by heavy metals beyond the normal standards, and only usable for irrigation and industrial activities.

8.10.8 Hydrological characteristics and channel dynamics

8.10.8.1 River flow seasonality

All rivers crossed by the SCP have highly seasonal flow regimes, driven by annual snowmelt processes. Peak discharges occur between April and June on average, with low flows between September and February.

8.10.8.2 Hydrological extremes

Substantial flows have been recorded at some time for most rivers, especially the Great Caucasus rivers. The Geokchay River and Aksu Canal have the most constant flows. The Pirsagat and Djeyrankechmes Rivers in the east can dry up in the summer. Around 15-25% of total annual flow takes place in May alone. For half of the rivers more than 50% of the total annual discharge occurs between April and June.

8.10.8.3 River channel instability

Braided channels such as those commonly found on the rivers in Azerbaijan normally exhibit large width-depth ratios, steep channel slopes, high energy conditions, high bedload transport rates, a flashy discharge regime and active lateral instability.

Many of the fluvial systems crossed by the route are active, dynamic and meandering or braided, especially in the west, where the SCP approaches the foothills of the Lesser Caucasus. Many of the Kura tributaries are high-energy, mountain rivers, many occupying laterally mobile floodplain zones or incised into narrow gorges.

Mudflows have been identified as significant events affecting seven rivers crossed by the SCP. Of the 41 documented events, 34 occurred in the four main Great Caucasus river basins (Turianchay, Geokchay, and Aghsu), where damage was also greatest. All mudflows took place between April and October (peak frequency in May, June and July). However the pipeline crosses these rivers a considerable distance from their source where they are slower flowing and have often been canalised. Therefore mudflows are less likely to have a significant effect.

8.10.8.4 Indicators of channel dynamism

Dynamic channels result from the interaction of high river energy levels with erodible channel boundary materials. Numerous bank erosion examples are observable in the major Kura River tributaries and these are strong indicators of channel dynamism. Bank erosion is evidenced by steep, bare, undercut banks, extensive erosion cliffs, tension cracks behind certain bank faces, loose, easily-erodible sand and gravel bank materials, and damage to existing revetments, bridge and trestle supports and old pipelines. Bed scour is apparent and clearly demonstrated through the suspension of old pipelines that were once installed on the river bed as pseudo-aerial crossings. River bed gravels appear fresh, without significant algal growths, and are likely to be mobile during parts of the high-flow season.

The Shamkirchay River suffers from intense scour and bank erosion. Detailed engineering design was carried out in 1999, based on a one in 100-year flood event. Datasets for this crossing include flood frequency estimates, scour depth estimates and grain size analyses. The crossing also has gravel winning close by and immediately downstream.

Figure 8-17 Shamkirchay crossing reach in flood



Many of the rivers crossed by the pipeline after the Kura River East crossing have potentially dynamic regimes, particularly the Kurekchay (KP276.5) Shamkirchay (KP332), Zayamchay (KP357) and Tovuzchay (KP377.1). However many have been dammed upstream from the crossing points.

Crossings of the wadis in the drier eastern parts of Gobustan may also exhibit significant channel instability, particularly in relation to flash flood events.

8.10.8.5 Anthropogenic effects on watercourse stability

Gravel and sand extraction is actively taking place in the river beds of the Kura East, Shamkirchay and Tovuzchay Rivers. Extension of these activities into areas close to the pipeline route could impact on pipeline integrity. Periodic dredging of canals by farmers may also result in the disturbance of shallow services.

8.10.9 Environmental change and pipeline route hydrology

Hydrologically important changes have taken place throughout the Azerbaijan/Trans-Caucasian region over the twentieth century, such as a mean air temperature rise, a significant rise in annual precipitation over the last 60 years, substantial fluctuations in the level of the Caspian and regional alterations of socio-economic conditions.

Given these recent changes and future climate predictions, significant environmental changes may be anticipated within the design life of the pipeline. These may include:

- Altered climate (precipitation and temperature)
- Changes to land use, agricultural activities (including irrigation), industrial activities (including water abstraction and discharge)
- Variation in water elevation in the Caspian

Such changes may alter hydrological regimes and water quality, affect future flood characteristics, river flows and soil erosion rates over the design life of the SCP.

8.10.10 Key issues

Key issues relating to hydrology along the route of the pipeline are as follows:

- Importance of the Kura River for water resources in Azerbaijan
- Seasonal flow regime of many of the rivers crossed
- High sediment load of many rivers crossed
- Poor channel stability of rivers such as the Djebrankechmes River and Kura East River
- Ecological value of certain rivers, such as the Kura East and West River, Korchay River and Hasansu River (discussed further in Section 8.14 Ecology and Protected areas)

8.11 HYDROGEOLOGY

8.11.1 Introduction

The hydrogeological characteristics along the pipeline route have been assessed using the following criteria:

- Soil/subsoil permeability from depth 1m to depth 4m, according to the following scale, (using data from the Shah Deniz midstream geotechnical investigations (Gibb 2001)):
 - Class 1 = very low permeability (clay)
 - Class 2 = low permeability (silt and fine sand)
 - Class 3 = medium permeability (medium to coarse sand)
 - Class 4 = high permeability (gravels / cobbles)
 - Class 5 = very high permeability (fissure flow)
- Groundwater vulnerability, based on type and importance of aquifer, using the following scale:
 - Class 1 = Non-aquifer
 - Class 2 = Confined aquifer - local importance
 - Class 3 = Confined aquifer - regional importance
 - Class 4 = Unconfined aquifer - local importance
 - Class 5 = Unconfined aquifer - regional importance

In terms of subsoil permeability, it should be noted that there is a degree of subjectivity in the classification for the following reasons:

- Trial pit logs do not extend below 4m, therefore the assessment has been made only of a partial profile. Classifications based on borehole data are thus more representative than those based on trial pits
- The relevant section of the logs may contain different lithologies. In most cases, we have chosen to err on the side of caution. For example, if the 3m section (1-4m) contains 1.5m silt and 1.5m gravel, the location would receive a rating '4'. If, however, the gravel was only a thin bed within silts, a compromise designation of '3' may be chosen
- The trial pits and boreholes are not evenly distributed along the borehole route, and do not reach a density of one per kilometre. Thus, a significant amount of interpolation between investigation points has been necessary. For example, between KP414 and KP426 there is no available geological survey information
- The route used for the geotechnical investigation deviates significantly from the latest SCP route (route 010) between KP365 and KP390

With regard to groundwater vulnerability, it should be noted that the applied classification is not ideally suited to the situation along the pipeline route for several reasons:

- It takes no explicit account of water quality (ie, whether water is potable or not)
- Along parts of the pipeline route, there may exist a vertical sequence comprising an unconfined aquifer complex and several confined aquifer complexes
- It does not recognise that a deep unconfined aquifer may be overlain by a substantial protective (though not confining) layer of silt and clay, whereas a confined aquifer may be very shallow and confined by only a relatively thin layer of clay

The results of the classification are displayed graphically in Figure 8-18. In general, groundwater can be regarded as vulnerable to contamination from pipeline construction or operation where the subsoil permeability is high, and where there exists an unconfined aquifer of local or regional importance.

8.11.2 Hydrogeological conditions east of Yevlakh

From KP0 (Sangachal) to the Kura River at KP223, there is likely to be little conflict between potential contamination from the pipeline and potable groundwater interests. This is because the subsurface sediments are generally fine-grained, groundwater recharge is very low and groundwaters are saline and not suitable for exploitation as potable water resources. Regional head gradients are also likely to be dominantly upwards. Aliyev (2001) and the published hydrogeological map (Aliyev et al. 1992) support this viewpoint.

Between Sangachal and Kazi Magomed, terrain varies in elevation and is, in places, steep. Sediments are dominantly argillaceous and groundwaters saline. The main exception is in the alluvial deposits of the Pirsagat River, where limited fresh groundwater resources are stated to occur (Aliyev 2001).

Figure 8-18 Groundwater Vulnerability along the Pipeline Route

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On the Shirvan Plain, head gradients are low (0.03 to 0.0007) and decrease in the direction of the Kura River. The thickness of significantly transmissive strata also decreases towards the Kura River and is believed to be of the order of 10-20m in the pipeline corridor. Hydraulic conductivities are believed to be 0.1-3md⁻¹ in the water-bearing strata. On the pipeline route across the Shirvan Plain, groundwater mineralisation is typically in the range 5-100gI⁻¹. The water table is generally within 3m of the ground surface over 90% of the area of the Shirvan Plain, partially owing to protracted infiltration of irrigation water from canal systems. On the pipeline route, only in the regions of Kurdamir and Shakyar-Kobu is the groundwater level expected to be deeper, approximately 5-10mbgl (Aliyev 2001).

Three caveats to the general designation of low groundwater vulnerability in this section should be noted:

- There may exist small (unmapped) pockets or lenses of fresh groundwater along the route. These, if they exist, are likely to be extremely important to local herdsmen, nomads and villagers in this arid region because fresh groundwater reserves are scarce (in the arid east of Azerbaijan, water is often tankered in and sold by the bucket - Wolfson and Daniell 1995)
- Where permeable strata exist, groundwater resources are likely to be brackish or saline, and thus of little use as a drinking water resource. They may, however, have a potential use as irrigation water (under some circumstances) or as a water resource for industrial use. Such uses of water are obviously less sensitive to contamination than potable usage. However, even such low sensitivity usages will be susceptible to gross contamination by hydrocarbons
- Even where usable groundwater resources do not exist, permeable strata in the subsurface may be efficient at transporting spilled or leaked contaminants to surface water receptors such as streams or irrigation canals, where the presence of contamination could have an adverse impact

In the immediate vicinity of the Kura East River crossing, high permeability alluvial sediments occur, which are assumed to have potential value as aquifers (KP217-225). Such deposits are also likely to be efficient at transporting spilled or leaked contaminants via the subsurface to the Kura River.

8.11.3 Hydrogeological conditions west of Yevlakh

West of the Kura River, through Yevlakh and in the western outskirts of Yevlakh, confined aquifers exist which are exploited for reserves of fresh groundwater. This confined groundwater is not believed to be vulnerable to contamination from construction or operation of the proposed pipeline, as it is confined typically by at least 10m of clay. In this area, shallow 'unconfined' groundwater is encountered at depths of only 1-2mbgl, typically in sands and loamy sands with hydraulic conductivities of 0.1-3md⁻¹. It is usually highly mineralised (10-15gI⁻¹) and generally unsuited to potable supply, but may conceivably have applications for industrial usage. The subsurface may also permit spilled hydrocarbons to migrate to surface water recipients, or permit vapours to migrate into dwellings. In general, however, the sensitivity of groundwater to contamination is regarded as low.

Further west, especially west of the Goranchay River, on the Ganja-Kazakh Piedmont Plain, unconfined groundwater becomes progressively fresher and should be regarded as an exploitable resource. Its sensitivity to contamination thus increases. The aquifer complex here comprises proluvial and alluvial deposits of sands, gravels and cobbles, alternating with silty/clayey interlayers. The complex generally becomes finer grained away from the Lesser Caucasus towards the Kura River. The aquifer horizons here are conventionally divided into one upper, partially unconfined aquifer complex (Russian *gruntovaya voda*) and four confined

aquifer complexes (Russian *napornii vodonosnii gorizont*), largely on the basis of the stratigraphic proximity of aquifer horizons with similar water chemistry. These subdivisions are largely symbolic and arbitrary as the real structure of the aquifer is complex with many alternating coarse and fine layers that vary laterally. Ultimately, the sedimentary succession must be viewed as a single unit.

On the Piedmont Plain, depths to groundwater are low (<5m) in the Goranboy/Goranchay River area and in the valleys of the main rivers. Depths to water table can exceed 25m in interfluvial areas. Groundwater is generally fresh (<1g/l mineralisation) except in the area immediately north and north-east of Goranboy. The hydraulic conductivity of the upper aquifer complex is stated by Tagiev and Alekperov (2001) to be in the range 0.1-13.4md⁻¹, although values of 20-100md⁻¹ may be more typical for the gravelly/cobbly strata.

In the immediate subsurface of interfluvial areas of the Ganja-Kazakh Piedmont Plain, there are often layers of silt or clay, which will hinder (although not necessarily prevent) the downward migration of hydrocarbons to the water table. Several confined aquifer horizons, with fresh groundwater reserves, also exist beneath most of the area. These are generally not regarded as being vulnerable to potential contamination from pipeline-related activities.

Throughout the Ganja-Kazakh Piedmont Plain, both unconfined and confined aquifers are exploited by wells, boreholes, springs and karizes for potable, irrigation and industrial uses. In recent years, the total rate of production of subsurface waters for the entire Piedmont Plain was between 820,000 and 1,130,000m³d⁻¹ (9,500 to 13,100l/s⁻¹). Musaev and Panakhov (1971) reported more than 300 karizes in the unconfined aquifer of the Piedmont Plain, with a total flow of more than 6,000l/s⁻¹.

In the valleys of the major rivers (Tovuzchay River, etc) draining the north-eastern slope of the Lesser Caucasus, vulnerability of groundwater is regarded as extremely high, for the following reasons:

- The immediate subsurface is generally sandy/gravelly/cobbly, with a high degree of interconnectivity
- The water table is relatively shallow
- The gravels of the immediate subsurface may have been 'winnowed' of fine material by fluvial reworking and the deposits may thus be especially permeable

A spill in such valleys could have particularly severe implications because contaminants may migrate rapidly vertically downwards to groundwater resources, down-valley through fluvial sediments or laterally to the surface watercourse through fluvial sediments.

For similar reasons (shallow water table, gravelly/cobbly subsurface strata, highly permeable aquifer strata), large portions of the Karayazi Plain section of the pipeline route are regarded as rather sensitive as regards groundwater contamination. In this area, inhabitants are known to use shallow groundwater for drinking water supply. Shallow groundwater also supports wetland areas of considerable ecological value.

8.11.4 Key issues

Key issues relating to hydrogeology along the pipeline route are as follows:

- Groundwater east of Yevlakh is largely unpotable and not exploited
- Groundwater is shallow and heavily exploited for potable and irrigation use to the west of Yevlakh

- Groundwater in the Karayazi aquifer, to the west of the Kura West River crossing is particularly vulnerable due to its shallow nature and highly permeable overlying strata

8.12 LANDSCAPE AND LAND USE

8.12.1 Introduction

Landscape and land use along the SCP are mainly determined by the combination of relief, climate, geology, topography soils and hydrology. Land use, with an emphasis on social issues, is studied in greater detail in Section 9.

Four distinct landscape areas can be identified along the SCP route:

- Sangachal Terminal to Kazi-Magomed (KP0-52)
- Kazi-Magomed to the Ganjachay river (KP52-296)
- Ganjachay river to Akstafa (KP296-357)
- Akstafa to the Georgian Border (KP357-442)

The extent of these areas can be seen on the Environmental Route Maps in Volume 2. It must be emphasised that these are broad categories intended only to provide a guide to land type and usage. Whilst each region does have its own general characteristics, there is also much variation within these landscape and land use regions. A description of each area is provided below.

8.12.2 Sangachal to Kazi-Magomed (KP0-52)

From the Sangachal Terminal, the SCP route runs south-west to Kazi-Magomed, passing through semi-desert and desert habitat. The landscape is generally arid and flat, with no trees, hedges or fences to obscure long distance views in all directions.

However, several ranges of low hills are crossed by the SCP, each extending for approximately 1km. Characteristic of this region is the occurrence of mud volcanoes, full details of which are provided in Section 8.6.

A number of erosion channels and wadis are present in this district; they are dry throughout summer but flow following periods of heavy rain. Sinkholes are present along the courses of many of these wadis.

There is little cultivation of land due to aridity and agricultural practice is predominantly limited to the over-wintering of grazing livestock. There are small regions devoted to fruit and vegetable production, especially the drier sub-tropical crops such as figs, almonds and olives.

8.12.3 Kazi-Magomed to Ganjachay River (KP52-296)

For the whole of this section, the SCP route is located on the almost-flat alluvial plains of the fertile Kura River valley and consequently the land use is dominated by agriculture. Agriculture is sustained through an extensive system of irrigation canals and ditches, although over-production and poor irrigation in combination have lead to a slow decline in agricultural

activities. There are also some larger scale water management schemes such as the damming of the Korchay River (KP292) in the vicinity of the pipeline crossing.

The main crops grown in this region are cereals, subtropical fruits (such as melons and watermelons), vegetables and cotton. The land also provides good grazing for cattle.

The intensive agriculture practised here has led to the development of complementary light industry. Cotton cleaning and food processing are both widespread.

Figure 8-19 Fallow and cultivated land along the pipeline route between Ganja and Tovus



8.12.4 Ganjachay River to Akstafa (KP296-394)

There is a clear variability in topography across this region, especially in comparison to land at the eastern end of the route. As well as areas that are flat and in arable use, there are long stretches of rolling hills, which provide grazing for livestock (Figure 8-20).

The hills are low, with a sparse desert or semi-desert vegetation and are occasionally interrupted by a flat, broad river flood plain. Erosion processes are common in these hills and gullies form a common feature of the landscape.

Agriculture again dominates the land use of this region (Figure 819). In addition to the cereals and cotton grown on the Shirvan Plain there are numerous vineyards in the region, around Shamkir, Tovuz and Akstafa, which is one of the major wine producing areas of Azerbaijan.

8.12.5 Akstafa to the Georgian border (KP394-442)

The SCP route passes to the north east of Akstafa, traversing undulating land crosscut by minor tributaries which feed into the Kura River. Some of this land is used for agricultural purposes.

After the western crossing of the Kura River (KP411) the route runs parallel to the river, through agricultural land, to the border with Georgia. The land is used extensively for the grazing of livestock and it is maintained by a complex system of irrigation canals.

Figure 8-20 Cultivation in valley areas, grazing on hills in the Ganja to Tovus region



The SCP passes over the Karayazi Aquifer at the western end of the route within Azerbaijan, between KP405 and the Georgian border. Land here is relatively flat and often waterlogged.

8.12.6 Key issues

Key issues relating to landscape along the pipeline route are as follows:

- Much of the route is flat, with no trees, hedges or fences to obscure long distance views
- The mud volcano ridge and the approaches to the Tovuschay, Azrinchay and Hasansu rivers are steep, erodable ridges; gullies form a common feature of the landscape in these areas
- Land use within almost-flat alluvial plains of the fertile Kura River valley is dominated by agriculture, which is sustained by an extensive system of irrigation canals and ditches
- The desert and semi-desert areas are used for grazing

8.13 CULTURAL HERITAGE AND ARCHAEOLOGY

8.13.1 Introduction

The cultural heritage of an area may be profoundly affected by a large-scale construction project if not handled sensitively. With careful management and planning however, it is possible to complete such projects with minimal impact on the cultural resources of an area and in addition, to provide a substantial increase in the quantity of archaeological information available for a region.

The known archaeological sites along the pipeline have been identified for an area approximately 1km wide around the pipeline route and potential areas of concern have been highlighted. An archaeological strategy was designed at an early stage of the work and this has led to the development of a Cultural Heritage Management Plan for the pipeline.

Archaeologists from the Institute of Archaeology and Ethnography have surveyed the pipeline route in Azerbaijan. The extent and nature of features visible on the ground has been taken into account during the pipeline routing process. At locations where large archaeological areas were identified, other route options were considered. The most appropriate management technique for each site that could not be avoided, and/or might be affected, was then developed.

In addition, a series of aerial photographs of the pipeline route has been examined to assess their value in determining the visibility of archaeological information. A large number of features of potential archaeological interest have been identified through this exercise.

Results of the field surveys combined with previously known archaeological information has produced a large quantity of information. This information is being assessed to provide data on the extent and significance of individual sites in the pipeline corridor. Although this evaluation is ongoing, it is already apparent that there are areas of interest along the SCP route that will need to be addressed by further surveying. Agreement has been reached with Institute of the Archaeology and Ethnography on the proposed programme of work.

8.13.2 The archaeological monuments of Azerbaijan

Azerbaijan has a wealth of evidence for earlier human societies that lived in the area. All stages of human development have been encountered on archaeological sites in the country. Archaeologists have recorded monuments of the Palaeolithic, Mesolithic, Neolithic and Eneolithic eras, together with Bronze and Iron Ages. These include the oldest settlements of the Stone Age - Azykh and Taglar, the monuments of the Kura-Araks culture, rock drawings of Gobustan and sites connected with the nomadic tribes of Skiphs, Saksxes and others.

Azerbaijan is also rich in the cultural remains of later developed social states, such as various settlements, caravanserais, defensive walls and burial grounds. The region has always been an important trade route, both east to west and north to south, but it was mainly during the Middle Ages, that many of the important trading centres developed.

In Azerbaijan, the SCP follows one of the historic east-west routeways passing between the two Caucasian mountain ranges. Close to the pipeline corridor, there are two major trading cities, Shamkir and Shirvan, both dating from medieval times. These cities were based on the wealth of traders and passing contacts travelling along the Great Silk Road from Asia to the Mediterranean.

This part of Azerbaijan also contains the most productive soils of the country and there are many settlements based on agriculture. The earliest farmers were the Neolithic Kura-Araks culture, whose remains are found all over Transcaucasia, through the Anatolian Plateau and into parts of Iran and Iraq. The area around Akstafa contains many large settlement mounds, or tepe, formed from the occupational debris of many hundreds of years of occupation. These date from the late Neolithic and Bronze Age to much later.

Azerbaijan contains many archaeological monuments of international importance for the understanding of human development. There are many sites that can be classed as being of national significance, and others are important at a local level.

8.13.3 Legal protection of cultural monuments

Immovable architectural and archaeological monuments are provided with state protection in Azerbaijan. The Cabinet of Ministers of the Azerbaijan Republic has approved the list of monuments shown in Tables 1 and 2 Part 2c, Baseline Reports Appendix.

The monuments of the whole of Azerbaijan are divided into three classes in accordance with their importance:

- Monuments of world and national importance, comprising 64 architectural and archaeological monuments
- Monuments of national importance, including 583 architectural monuments and 3109 archaeological monuments
- Monuments of regional importance, comprising 3318 architectural monuments, 195 monuments of garden-and-park culture and landscape architecture, and approximately 2000 archaeological monuments

A number of national reserves have been established by the Order of the Cabinet of Ministers of the Azerbaijan Republic. Currently, 14 historical-and-architectural, historical-and-archaeological, historical-and-cultural, and historical-and-ethnographical reserves exist. These are listed in Table 3 in 2c, Baseline Reports Appendix.

With the exception of the Gobustan Archaeological Reserve (see Section 13.4.1), none of the sites described above fall within the pipeline study corridor.

Cultural heritage and archaeological remains and artefacts are legally protected in the Azerbaijan Republic by national legislation which is supported by the various international conventions and recommendations ratified by the Republic. These include the Convention on Protection of World Cultural and Natural Heritage (Paris, 1972) and the European Convention on the Protection of the Archaeological Heritage (Valletta, 1992).

The national legislation regarding cultural sites in Azerbaijan has recently been amended. Article 18 of the Law on '*Protection and Utilisation of the Cultural and Historical Monuments*' requires the promoter of a new project to conduct archaeological surveys. In cases where archaeological features are encountered, excavation and adequate recording must be carried out prior to construction works.

As a result of the recent amendments, the Ministry of Culture of the Republic of Azerbaijan is responsible for issuing permits for the excavation of archaeological and heritage sites. Decisions about the granting of permission are made following advice from the Academy of Sciences of the Republic of Azerbaijan.

Restoration works on architectural monuments may only be carried out if the Ministry of Culture has issued a licence for such works.

8.13.4 Archaeological sites on the pipeline route

The archaeological surveys to date on the various route options of the pipeline have identified over 150 sites. The route selected for the SCP contains approximately 70 locations of archaeological potential close to the alignment (see Figure 8-21). The pipeline route has been amended to avoid a number of these archaeological locations.

The most significant archaeological features on, or close to the route, are described below and are shown on the Environmental Route Maps (Volume 2).

8.13.4.1 Gobustan archaeological reserve

The Gobustan area contains many hundreds of rock drawings or petroglyphs of humans and animals together with other evidence of human occupation. The rock art dates back up to 10,000 years, with some carvings being interpreted as even older. Rock decoration in Gobustan continued into the historic period as evidenced by a Roman inscription and a possible depiction of Arab traders.

The continued use of the area is a reflection of the changing sea levels of the Caspian. During the Mesolithic period, the sea was higher and came to the foot of the rock outcrops, which then formed a suitable location for habitation. Many of the early depictions of deer, goats and cattle are thought to be part of a shamanistic belief system, while others show scenes of everyday life.

Rock decoration is found on three of the hills in the area (Figure 8-22); Beyouk Dash (Big Rock) which contains most of the famous carvings, Kichik Dash (Little Rock) to the south and Djingir Dag to the north. The carvings were first noticed in the 1930s; many more were identified during surveys and excavations by I Jafarzade and others during the 1950s and 60s. Other hills also contain similar rock art, for example, goat petroglyphs were found during an archaeological survey in 2001 on the hill to the north of Sangachal terminal (Site 159).

Figure 8-21 Archaeological Sites along the Pipeline Route

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Figure 8-22 Rock Art in Gobustan



The pipeline crosses the Archaeological Reserve of Gobustan for about 1km at a position close to the Reserve's northern border (approximately KP9–10). The pipeline route runs approximately 1km to the north of Djingir Dag and crosses an open area of semi-desert between Djingir Dag and a small hill (apparently an extinct eroded mud volcano) known as Topa after crossing the Djerankechmes. No archaeological sites have previously been identified in this area, but a number of potential locations have been identified during the archaeological survey through surface finds of medieval and later pottery.

8.13.4.2 Surface spreads of artefacts

Many of the potential areas of archaeological interest have been identified by the observation of artefacts on the surface of the ground, either in areas of thin vegetation cover or on cultivated soil. Some of these represent parts of sites previously recorded or known through work conducted during the WREP project. Examples of these are Neymatabad, Mingechaur and Dalmamedli (Sites 56, 57 and 60 See Environmental route Maps, Volume 2). Due to the difficulty of assessing the significance and extent of these sites, the programme of further work will include a sample of this type of site.

8.13.4.3 Earthworks and other surface features

Some of the archaeological areas can be recognised by surface features, in particular the mounds left by multi period settlements. Examples of these are Nadirkand, Zayem 2 and Girag Salakhli (Sites 59, 111 and 138). Other features such as the abutments of the medieval

bridge over the Zayamchai (Site 114) and the towers and walls of the citadel of old Shamkir can be easily identified.

8.13.4.4 Aerial photography

A series of aerial photographs of the pipeline route were examined for potential archaeological features. The vertical photographs taken at a scale of 1:15,000 in colour each covered an area slightly over 2km wide. Both print and digital copies were examined. The full extent of the aerial view was examined and information was obtained about features within 1km of the pipeline route.

Almost 1500 features were identified in the survey. The majority of these are thought to be recent in origin and include features formed by agricultural, military and oil extraction activities. Others originate from nomadic herding and represent the winter occupation areas of pastoralists. These were particularly dense south of the road between Guzdek and Sigirli and in places, showed superimposition that implies the features could span a considerable period of time. Many of the present day pastoral settlements are surrounded by evidence of previous phases of settlements. There is a considerable variation in the form of these settlements that suggests traditions have changed over the period of use.

After further evaluation, approximately 40 of the features were felt to be of archaeological origin. This was either due to their location (proximity to known archaeological sites) or through their form. Many appear to be enclosures, usually circular in shape. From an initial examination of the sites, 7 appear to be within approximately 200m of the SCP as shown on the Environmental Route Maps (Volume 2).

Known archaeological sites were also examined on the aerial photographs, but no additional information was obtained about their extent. This was particularly disappointing for the larger sites such as Zayamchay (Site 111).

8.13.5 Key issues

Key archaeological issues along the pipeline route are as follows:

- The pipeline has unavoidably crossed the Gobustan Cultural Reserve for approximately 900m
- Several important sites have been identified and will be the subject of intrusive investigation prior to pipeline construction
- Much of the archaeology along the pipeline route is as yet unknown

8.14 ECOLOGY AND PROTECTED AREAS

8.14.1 Introduction

Natural habitats and the species of plants and animals within them are of vital importance to the protection, maintenance and continuing functionality of the world's ecosystems. The conservation of these natural habitats and their biodiversity, not only of species but also of genes and populations, is therefore essential for long-term sustainable development.

This Section summarises the findings, in terms of ecological and nature conservation interest, of a desk-top study and field surveys conducted along the proposed SCP route. A detailed

description of the ecological baseline, including the surveys undertaken for this project, is provided in the Ecological Baseline Report, Part 1 of the Baseline Reports Appendix.

The conservation status of species of flora and fauna has been assessed with reference to:

- The Red Data Book (RDB) for Azerbaijan (1989)
- Information from local scientists on proposed additions to the Red Data Book (pRDB)
- European Bird Populations: Estimates and Trends (Birdlife International/ European Bird Census Council, 2000)
- The 2000 IUCN Red List of Threatened Species

Description of conservation status categories, referred to throughout the following sections is provided in Table 8-10.

Table 8-10 Threatened species status categories

Status Category	Description
le	Species of International Conservation Concern – endangered
lv	Species of International Conservation Concern – vulnerable
llr	Species of International Conservation Concern – low risk
Ee	Bird of European Conservation Concern - endangered
Ev	Bird of European Conservation Concern - vulnerable
Er	Bird of European Conservation Concern – rare
Ed	Bird of European Conservation Concern - declining
RDB	Listed in Red Data Book of Azerbaijan Republic
PRDB	Proposed for inclusion in Red Data Book of Azerbaijan Republic

8.14.2 Overview of flora and fauna in Azerbaijan

Azerbaijan lies at the convergence of at least three biogeographic provinces, where species typical of Europe (eg brown bear, lynx, chamois, red deer), Central Asia (eg wild goat, leopard), and Asia Minor (eg striped hyena, goitered gazelle) occur. This geographic position, combined with the country's varied climate, topography and geology, has resulted in high levels of biodiversity. The key biodiversity ecosystems within Azerbaijan include marine and coastal biomes, forests (lowland and montane), subalpine and alpine meadows, dry and semi-desert areas, grassland/steppes and wetlands.

The flora of Azerbaijan comprises approximately 4,200 identified species, divided into 125 families and 920 genera. An estimated 270 species of plants (6.4%) are endemic to Azerbaijan. The fauna of the country is represented by 99 species of mammals, 360 species of birds, 54 species of reptiles, 11 species of amphibians, 95 species of fish and 14,000 species of insects. Azerbaijan is particularly important for some animal groups especially birds and bats.

In all, Azerbaijan has 77 animal species and three plant species that are considered threatened (IUCN, 2000). The RDB for Azerbaijan was first published in 1989. It lists 50 species of plant, five species of fish, five amphibians, eight reptiles, 36 birds, and 14 species of mammal as threatened (no information is provided on how the degree of threat has been assessed). A second edition is currently in preparation.

The main threats to Azerbaijan's biodiversity have been identified as pollution, habitat destruction, over-exploitation of wildlife populations and other threats such as war and rise in Caspian sea level.

8.14.3 Protected areas

In Azerbaijan, sites or areas of particular importance for nature conservation are designated as protected areas covered by the *Law on the Protection of the Nature Environment and the Utilisation of Natural Resources* (Anon, 1992). There are a number of different levels of protection (see Table 6, Part 1 of Baseline Reports Appendix) ranging from the Nature Reserve (where no public access is allowed) through to Hunting Areas (where licenced hunting is possible) and the protection of individual trees or palaeontological sites. Several of the Protected Areas in Azerbaijan have also been assigned a Management Category by IUCN (1994).

Only ten protected areas, of which four are proposed sites, are situated within 10km of the proposed pipeline route. Table 8, Part 1 of Baseline Reports Appendix gives an indication of the location and proximity of the protected areas to the proposed SCP, while the Environmental Route Maps (Volume 2) show the spatial extent of the areas.

During the SCP routing process emphasis was placed on avoiding designated protected areas, as well as habitats or species sensitive to disturbance. As a consequence, the majority of the proposed SCP route crosses agricultural land (62.2%). Figure 8-23 shows how it has been possible to route around the Korchay and Shamkir Reserves which were crossed by the WREP.

It has not been possible, however, to avoid crossing the proposed Gobustan State National Park (KP 19.5-28.5), which comprises a range of desert habitats. The proposed State National Park has an area of 178,700ha and includes 2% of the total route (see Figure 8-23).

Other protected areas that are close to, but not directly affected by, the proposed route are:

- The Barda State Forbidden Area which is directly downstream from the Kura East River crossing. This State Forbidden Area comprises 7,500 ha on Tugay river forest in the Barda/Agdas Regions
- The Karayazi reserve downstream of the Kurudera River crossing and comprising 17,873ha of Tugay river forest in the Kazakh Region
- The Samukh State Hunting Area, which covers 40,424ha of primarily wetland habitats and includes part of the Mingechaur Reservoir

Figure 8-23 Location of Protected Areas and Species Observations along the SCP
INSERT A3 map and 2x page breaks

Azerbaijan is in the process of becoming a Contracting Party to the Ramsar Convention having recently submitted its instrument of accession to UNESCO. The Ramsar Convention is aimed at protecting the wildlife and habitats of internationally important wetlands. Lake Jandari, which is located approximately 3km to the north of the proposed SCP route and straddles the border between Azerbaijan and Georgia, has been included in the book of potential Ramsar sites in Azerbaijan. However, it is not known when, or if, this site will become designated.

8.14.4 Habitats & vegetation

The vegetation types along the proposed SCP route have been categorised into six broad habitat types and specific community types where possible. These are detailed in Table 8-11 and have been mapped on the 1:50,000 scale Environmental Route Maps (Volume 2).

Table 8-11 Extent of the main habitat types crossed by the proposed SCP

Habitat Type	Length in km	% of Total Length
Desert	110.15	24.9
Semi-desert	35.5	8.0
Scrub and trees	4.3	1.0
Wetland (incl. water courses)	16.25	3.7
Agricultural	275	62.2
Other (quarries, refugee camps, etc)	0.8	0.2
Total	442	100

The majority of land crossed by the proposed SCP route is agricultural and is of little nature conservation interest, with respect to plant species. 0.2% of the route is taken up by other land uses such as quarries and has negligible ecological value.

The remaining 37.6% of habitats along the proposed SCP route are of increased nature conservation importance since they have a greater structural and species diversity compared to agricultural land and are more semi-natural in character (although many of these habitats have been subject to significant degradation).

A description of the main habitat types and their distribution along the proposed SCP route is provided below.

8.14.4.1 Desert and semi-desert

The following 14 desert plant communities were identified along the proposed SCP route during field surveys and are identified by the codes D1 – D14 on the Environmental Route Maps (Volume 2):

- D1 *Artemisia fragrans* (Mugwort species)
- D2 *Artemisia fragrans* and *Salsola nodulosa* (Mugwort and saltwort species)
- D3 *Artemisia fragrans* and *Salsola dendroides* (Mugwort and saltwort species)
- D4 *Artemisia fragrans* and *Suaeda dendroides* (Mugwort and seablight species)
- D5 *Salsola nodulosa* (Saltwort species)
- D6 *Salsola dendroides* (Saltwort species)
- D7 *Suaeda dendroides* (Seablight species)
- D8 *Kalidium caspicum*
- D9 *Halocnemum strobilaceum*
- D10 *Capparis spinosa* (Spineless caper)

- D11 Ephemeral desert
- D12 Interzone
- D13 *Salsola nodulosa* and *Artemisia fragrans* (Saltwort and mugwort species)
- D14 *Salsola ericoides* (Saltwort species)

Of the above, the most common types encountered along the proposed SCP route were mugwort species (*Artemisia fragrans*) and saltwort species (*Salsola nodulosa*), either occurring as individual dominants or as co-dominants.

The desert communities in the Gobustan area represent the most ecologically important habitats from a botanical point of view, along the proposed SCP route. The Gobustan area is of national significance as this area is a stronghold for mugwort (*Artemisia fragrans*) communities and is one of the reasons why a significant proportion of the Gobustan desert has been proposed as a State National Park. Desert plant communities such as these, which develop slowly, are particularly susceptible to disturbance and are easily lost, taking many years to recover.

Semi-desert habitat is more prevalent in the slightly wetter western part of the proposed SCP route and is differentiated from desert by a greater density of plant cover and the interconnection of the root systems from different plants. However, the species that comprise semi-desert habitats are generally the same as those in the desert. The most frequently encountered semi-desert type along the proposed SCP is the mugwort (*Artemisia*) community characterised by green grass in winter due to autumn rains.

8.14.4.2 Wetlands

Numerous small-scale wetlands are located along the proposed SCP route and can be split into four types: rivers, irrigation canals and ditches, marsh or chal meadow and lakes and ponds.

Rivers

Due to the variable and often turbid flow of the rivers crossed by the proposed SCP the associated vegetation is limited to the bank sides and seasonally inundated margins. The riverside vegetation generally comprises scrub and tree species such as tamarisk species (*Tamarix ramosissima*), oleaster (*Elaeagnus angustifolia*), willow species (*Salix spp*), and poplar species (*Populus spp*) as well as swamp species such as common reed (*Phragmites australis*), sea club rush (*Bolboschoenus maritimus*), water-pepper (*Polygonum hydropiper*) and galingale (*Cyperus longus*).

Irrigation channels and ditches

Many irrigation ditches and canals occur in the extensive agricultural areas between Kazi-Magomed and the Georgian border. Due to disturbance by man, their flora is largely limited to common aquatic and shrub species including the common reed (*Phragmites australis*), bulrush (*Typha latifolia*) and purple loosestrife (*Lythrum salicaria*). The banks commonly support species such as tamarisk species (*Tamarix meyerii*), orache species (*Atriplex tartarica*) and camel prickly (*Alhagi pseudoalhagi*). Glabrose liquorice (*Glycyrrhiza glabra*), a pRDB species is also found in some of the shallow ditches.

Marsh or chal meadow

The chal meadow marsh community develops in hollows and low-lying areas and is generally slightly saline. It is usually seasonally inundated, is species-rich and is widely encountered along the proposed SCP (eg the drained Lake Shilyan (KP146), to the west of Kurdamir). Typical species include glabrose liquorice (*Glycyrrhiza glabra*) (pRDB), sea lavender species (*Limonium meyerii*), camel prickle (*Alhagi pseudoalhagi*), Bermuda-grass (*Cynodon dactylon*), saltwort species (*Salsola dendroides*) and orache species (*Atriplex tartarica*).

Lakes and ponds

Several man-made lakes occur along the proposed route, which support very similar vegetation to the river and canal banks, being dominated by common reed (*Phragmites australis*) and tamarisk species (*Tamarix spp.*).

8.14.4.3 Trees and scrub

Woodland is extremely restricted on the proposed SCP route. Small sections of approximately 150m to 600 m are crossed at KP105.5, KP106, KP175, KP223, KP387.5 and KP411.5 and KP423.5. The plantations are dominated by ash species (*Fraxinus spp*) and vardim oak (*Quercus longipes*). Some limited areas of scrub are also encountered at KP175, KP192.5 and KP411.5; these areas are dominated by tamarisk species (*Tamarix ramosissima*), forming either a mosaic with chal meadow species or dense scrub along river and canal banks.

8.14.4.4 Protected plant species

Several species, which are included in the RDB for Azerbaijan or, which are proposed for inclusion in the revised RDB have been recorded along the proposed SCP route. These are listed in Table 8-12.

Table 8-12 RDB plant species recorded along the SCP route

Species	Status	Occurrence	Location along the Route
<i>Glycyrrhiza glabra</i>	pRDB	confirmed (AIOC, 1997) (ERM, 2000), (AETC, 2001)	Artificial watercourses and chal meadow areas
<i>Iris acutiloba</i>	RDB	confirmed (AIOC, 1997)	Gobustan area
<i>Merendera trigyna</i>	pRDB	confirmed (AETC, 2001)	KP51 to the east of Kazi-Magomed at the western extent of the Gobustan desert area
<i>Punica granatum</i>	RDB	confirmed (AIOC, 1997)	Generally associated with canals, ditches and river banks
<i>Vitis sylvestris</i>	RDB	confirmed (AIOC, 1997)	Generally associated with canals, ditches and river banks

It should be noted that two species, namely woodland grape (*Vitis sylvestris*) and pomegranite (*Punica granatum*), will not be included in the revised edition of the RDB since further assessment of their status found it to be unnecessary. None of the RDB species have protected status internationally.

8.14.5 Fauna

There are many species of fauna present along the proposed SCP route and within the survey corridor, the majority of which are common and widespread. This Section, therefore highlights those species which have been identified as being of some level of conservation

concern, either on a national, European or world scale. The status categories used in tables in the following sections are described in Table 8-10. Table 8-13 provides a list of those species of concern along the proposed SCP route, which are most likely to be affected due to their ecological habits. These, and other, species are described in more detail in the following sections.

Table 8-13 Species of conservation concern along the proposed SCP

Species	Status	Occurrence
Spur-thighed tortoise (<i>Testudo graeca</i>)	RDB, Iv	Confirmed (AIOC, 1997), (ERM, 2000), (AETC, 2001)
Ship sturgeon (<i>Acipenser nudiventris</i>)	pRDB, Ie	Probable
Black francolin (<i>Francolinus francolinus</i>)	RDB, Ev	Confirmed (AIOC, 1997), (AETC, 2001)
Ruddy shelduck (<i>Tadorna ferruginea</i>)	Ev	Confirmed (AETC, 2001)
Chukar (<i>Alectoris chukar</i>)	Ev	Confirmed (AIOC, 1997), (AETC, 2000)
Stone curlew (<i>Burhinus oedicnemus</i>)	Ev	Confirmed (AIOC, 1997), (AETC, 2001)
Blue rock thrush (<i>Monticola solitarius</i>)	Ev	Confirmed (AETC, 2001)
Black-winged pratincole (<i>Glareola nordmanni</i>)	RDB, Er	Confirmed (ERM, 2000)
Kingfisher (<i>Alcedo atthis</i>)	Ed	Confirmed (AETC, 2001)
Glossy ibis (<i>Plegadis falcinellus</i>)	pRDB, Ed	Confirmed (ERM, 2000)
White-tailed plover (<i>Chettusia leucura</i>)	RDB	Confirmed (ERM, 2000)
Porcupine species (<i>Hystrix indica</i>)	pRDB	Confirmed (ERM, 2000)
Water vole (<i>Arvicola terrestris</i>)	pRDB	Confirmed (AIOC, 1997)
Common toad (<i>Bufo bufo</i>)	RDB	Confirmed (ERM, 2000)
Death's-head hawkmoth (<i>Manduca atropos</i>)	RDB	Confirmed (ERM, 2000)
Freshwater terrapin species (<i>Clemmys caspica</i>)	pRDB	Confirmed (AIOC, 1997), (ERM, 2000)
European pond terrapin (<i>Emys orbicularis</i>)	pRDB	Confirmed (AIOC, 1997)

8.14.5.1 Mammals

There are 14 species of mammal, identified as rare on a national or international scale, which have the possibility of being present in the vicinity of the proposed SCP route (see Table 13, Part 1 of Baseline Reports Appendix). Of these 14, eight have been confirmed as present along the proposed SCP route and are described below.

The following four species, all located along the proposed SCP route, are listed by the 2001 IUCN Red List of Threatened Species as being internationally rare:

- The barbastelle bat (*Barbastella barbastellus*), greater horseshoe bat (*Rhinolophus ferrumequinum*) and lesser horseshoe bat (*Rhinolophus hipposideros*) are known to be present in the Gobustan region
- The edible, fat or squirrel-tailed dormouse (*Glis glis*) has been recorded in the Tugay forest along the route of the WREP where it lives in the tree canopy during summer and hibernates at lower levels and sometimes underground during winter

A further two of the eight species are included in the RDB for Azerbaijan:

- Goitered gazelle (*Gazella subgutterosa*) confirmed in the Gobustan area
- Wild field cat (*Felis lybica*) present in the region of KP349 (just to the south of the Shamkir State Forbidden Area)

The remaining two species have been proposed for inclusion in the revised RDB:

- Water vole (*Arvicola terrestris*), recorded several times along the route of the WREP, lives in burrows in grasslands
- Porcupine species (*Hystrix indica*) - spines of this species were recorded at KP 171.5 (bank of the Goychay river), KP315 (near Kushkarachay) and KP 320.5 (near the Karasu river)

8.14.5.2 Birds

The avifauna along the proposed SCP route is diverse, with assemblages varying between the different habitats of desert, woodland, agricultural and wetland habitats. These assemblages also change throughout the year due to their high mobility and ability to migrate such that species can be summer breeders, resident, wintering or migratory.

Thirty-three species of bird of national, European or international conservation importance were highlighted during the surveys as possible species present along the proposed route; all but two of the species have been confirmed (see Table 14, Part 1 of Baseline Reports, Appendices).

Of the thirty-one confirmed species recorded along the proposed route, the following two are listed on the 2001 IUCN Red List of Threatened species, but are unlikely to breed in the vicinity of the proposed SCP:

- White-tailed eagle (*Haliaeetus albicilla*), which was recorded in Gobustan and in the Shamkir and Akstafa areas at KP0, KP328, KP402.5 and KP414
- Pygmy cormorant (*Phalacrocorax pygmeus*), which was recorded at the Kura East River crossing (KP223.6) and Jandari Lake

Eight species of birds of prey were regularly recorded in the vicinity of the proposed SCP route, but are unlikely to nest near it, preferring buildings or rocky crags. However, one, the hen harrier (*Circus cyaneus*), a species of European conservation status, does nest on the ground and has been recorded at KP368 and at KP144.5.

Several of the thirty-one species confirmed along the proposed route are ground-nesting species favouring desert, agricultural and wet meadow habitats. Those classed as vulnerable on a European basis include:

- Stone curlew (*Burhinus oediconemus*) confirmed in the Gobustan region at KP13.5

- Chukar (*Alectoris chukar*) recorded at KP12, KP106 and KP291.5, around the Korchay River
- Black francolin (*Francolinus francolinus*) also recorded at KP106.5 and KP291.5, around the Korchay River

Three of the ground nesting species are listed in the RDB:

- Black-winged pratincole (*Glareola nordmanni*) recorded at KP13.5
- White-tailed plover (*Chettusia leucura*) recorded at KP116, KP315 and KP411.5
- Sociable plover (*Chettusia gregaria*) recorded at KP140.5

The potential RDB species, glossy ibis (*Plegadis falcinellus*) was recorded near the irrigation canal at KP145.5, in a wetland habitat of Kushkarachay at KP319 and at KP396.5.

In addition, other breeding birds which have been recorded along the proposed SCP route include kingfisher (*Alcedo atthis*), blue rock thrush (*Monticola solitarius*), white stork (*Ciconia ciconia*) and collared pratincole (*Glareola pratincola*).

8.14.5.3 Amphibians

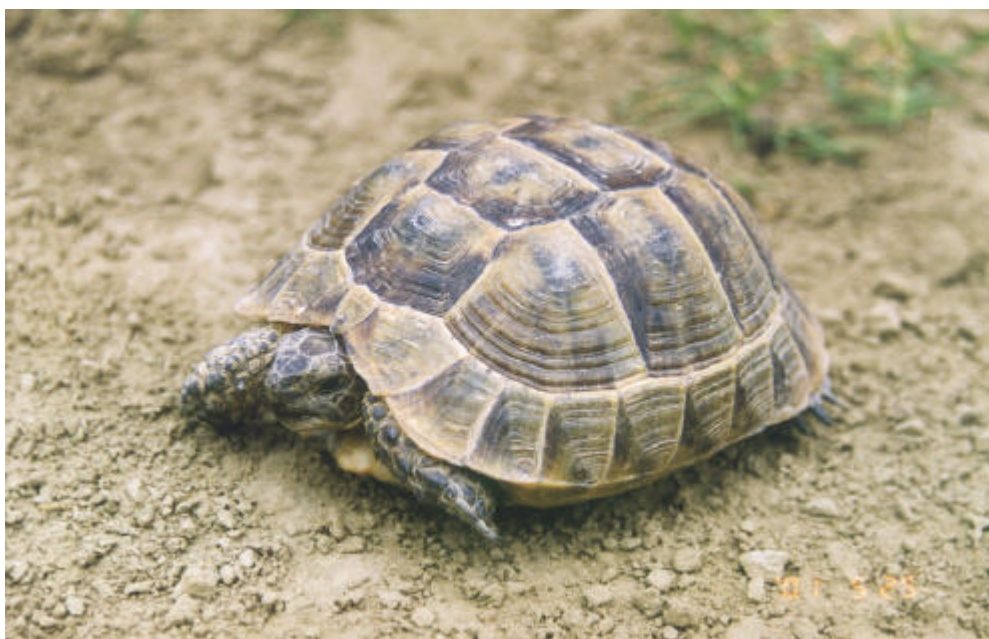
With respect to amphibians, only two species of conservation importance are thought to be present along the SCP route: the common toad (*Bufo bufo*) and the European tree frog (*Hyla arborea*). Of these, only the RDB species common toad (*Bufo bufo*) was recorded during surveys. This species was found near an irrigation canal at KP140.5 and on the edge of Tugay forest in a hollow fallen tree (KP223.5).

8.14.5.4 Reptiles

Reptile communities can be split between those which inhabit arid desert and semi-desert regions and those inhabiting wet lowland marsh, forest and waterbodies. Five species of national rarity are thought to be present in the vicinity of the SCP route.

One of these, the spur-thighed tortoise (*Testudo graeca*) (see Figure 824), is classed as vulnerable on an international basis by the 2000 IUCN Red List of Threatened Species. They live in burrows and usually hibernate during winter. This species has been recorded frequently in the desert, semi-desert and scrub habitats, mainly in the west of the SCP route and particularly in the Shamkir region. The population is large within Azerbaijan but the tortoise is susceptible to persecution and other anthropogenic impacts.

Figure 8-24 Spur-thighed tortoise



During the field surveys evidence of snakes was noted, specifically around man-made pond areas in the first 20km of the SCP. The ladder snake (*Elaphe hohonackeri*) (pRDB), was recorded towards the western end of the SCP route (KP311.5).

Two species of terrapin (*Clemmys caspica* and *Emys orbicularis*), both proposed for inclusion in the revised RDB, were regularly recorded in waterbodies such as lakes, ponds, canals and marshy areas along the SCP route.

8.14.5.5 Fish

The proposed SCP crosses 21 principal rivers and numerous minor watercourses. All the major rivers crossed, apart from the Djejranchekmes and Pirsagat Rivers (which occur in the eastern part of the SCP route and flow directly into the Caspian) form part of the Kura catchment .

Ten species of fish of conservation importance, which are either already in the RDB or proposed for inclusion, are known to exist within the Kura River and its tributaries (see Table 18, Part 1 of Baseline Reports Appendix. The Djejranchekmes and the Pirsagat do not hold any Red Data Book fish species.

8.14.5.6 Invertebrates

Many hundreds of species of invertebrate are thought to be present along the proposed SCP route, nine of which are RDB species (see Table 18, Part 1 of Baseline Reports Appendix). These include two species of bumble bee, two species of beetle, two species of butterfly, two species of hawk-moth and one species of crayfish.

Only one RDB species, hawk-moth (*Manduca atropos*) has been recorded along the proposed route, at KP139.5 and KP396.5. It is also likely that the crayfish (*Astacus pyzolwi*) is present in many of the watercourses along the proposed SCP route.

8.14.6 Key issues

The key issues in terms of habitats and species of flora and fauna along the pipeline route, with respect to construction of the pipeline are:

- *Artemisia* and *Salsola* deserts of the proposed Gobustan National Park
- Potential presence of *Iris acutiloba* in Gobustan desert habitat
- Potential presence of *Merendera trigyna* in Gobustan desert habitat
- Presence of *Glycyrrhiza glabra* on watercourses
- Presence of *Testudo graeca* in many locations along the pipeline route
- Presence of ground nesting birds of conservation importance
- Potential presence of *Hystrix indica* at several watercourses
- Potential presence of *Arvicola terrestris* at watercourses

8.15 EXISTING TRAFFIC CONDITIONS

8.15.1 Introduction

In order to develop an understanding of the baseline traffic conditions a traffic census was carried out on roads in Azerbaijan likely to be used by construction traffic during the lifetime of the SCP project. The baseline traffic information report is presented in The Traffic Baseline Report and Management Plan, Part 4 of the Baseline Reports Appendix.

The key objectives of the traffic census were to:

- Define the number of vehicle movements along the key access routes at different times of day
- Provide a breakdown of total vehicles on key access routes by type
- Identify key pinch points, restrictions and sensitivities along these access routes

8.15.2 Methodology

8.15.2.1 Route identification

Consultation with the route definition team and logistics engineers was carried out in order to optimise the choice of survey locations. Information on proposed pipe yard and construction camp locations was studied, in combination with the routes of suggested access roads. Forty nine survey locations were selected, at which traffic counts could be carried out on both main roads (generally the Baku to Tbilisi highway) and the more minor access roads.

Standard western traffic survey forms were modified to take into account the specific road conditions and the likely users of the roads in Azerbaijan. This included the addition of animal drawn carts and animal herds such as sheep, cows or flocks of geese.

8.15.2.2 Baseline traffic

Baseline surveys were required in order to identify the current levels and nature of traffic on the roads likely to be directly affected by the construction and operation of the SCP. Different types of vehicle using the road have different impacts in terms of noise, vibration, speed and

amount of highway capacity (and space) required. Manual classified vehicle counts were used to determine both volume and type of vehicle using the roads.

Census points were chosen at critical sections where construction traffic would be likely to travel. These included main roads in towns, river crossings, and access roads between pipe dumps, camps and the pipeline. A total of ten traffic surveyors were employed over a two-week period at the end of November and beginning of December 2001. The average count-day covered 8 hours, encompassing the busiest times of the day.

The survey census forms allowed differentiation between road users as identified in the left hand column of Table 8-14. These various sorts of users have differing impacts on the local environment, the highway pavement and the road capacity. They are also differentially sensitive to the impacts of the heavy lorry traffic that will be generated by construction of the pipeline.

In order to assess the variation in traffic flows throughout the week, two survey sites were surveyed over a seven day period. The locations of all the survey sites are provided in Part 4 of Baseline Reports Appendix.

8.15.3 Analysis of traffic data

After data collection and summation, the following analyses were undertaken:

- Assessment of additional flows generated by the construction and operation phases
- Analysis of total traffic flows
- Determination of highway capacity
- Identification of pinch-points
- Development of management measures

The traffic flow information has been processed so that the data can be compared consistently across all sites and against well-defined capacity standards.

A road user classification scheme has been developed, as presented in Table 8-14. The 'slow' category does not generally take up a considerable amount of the highways capacity but can reduce vehicle speeds and will be very sensitive to increases in heavy goods traffic. Light vehicles will generally move more quickly, take up more road space and could be disadvantaged by increases in slow moving heavily laden vehicles. Heavy vehicles will be less affected by construction traffic but the existing volumes will have implications in terms of net increases in noise and vibration and impact on pavements.

Table 8-14 Road user classification

Vehicle type	Category
Pedestrians	Slow
Animal Flocks	Slow
Bicycles	Slow
Animal Drawn Carts	Slow
Motorcycles	Light vehicle
Agricultural Vehicles	Light vehicle
Cars	Light vehicle
Minibuses	Light vehicle
Buses	Heavy vehicle
Trucks	Heavy vehicle

8.15.3.1 Average weekday traffic flows

Flows were very low over the survey period on almost all roads surveyed. Minimum two-way flows of less than 100 vehicles per day were observed and a maximum flow of just over 6,000 vehicles per day was recorded. Only two roads (the main and access roads at survey site 50) exceed 4,000 vehicles per day during the survey period.

Vehicle compositions vary greatly between sites. However, almost universally the proportion of pedestrians, cycles, animal drawn carts and animal herds represents less than 15% of roads users on the main routes.

The proportion of heavy vehicles on most of the roads was high, with 15-25% of vehicles falling into this category on many of the main roads. Many of the proposed access routes also form parts of the local road network feeding villages and towns from the main route between Baku and Georgia. Many of these also have substantial proportions of goods vehicle traffic.

Generally, the main road network is characterised by low traffic flows but serves a large volume of goods vehicle traffic. Most of the proposed access roads have lower volumes of traffic with a smaller proportion of light vehicles. On these roads the predominance of slow moving vehicles and heavy vehicles results in very slow travel speeds.

Figure 8-25 Typical railway underpass



8.15.3.2 Road capacity

The nature of the road network along the route has a considerable bearing on the ability of the roads to handle volumes of traffic. The following observations were identified as affecting the capacity of the local road system:

- A large proportion of roads are not metalled
- There is a lack of street lighting in most areas, and it is limited in urban areas
- Poor signage is typical
- A lack of road markings is typical
- Extensive use is made of single track roads
- Poorly maintained road surfaces and road drainage systems are common

- There is a lack of crash barriers and other safety infrastructure
- Direct frontage of commercial activities onto the roads is common
- Fixed infrastructure (eg bridges, underpasses and level crossings) are poorly maintained

Only direct observation can identify the maximum traffic capacities of the roads but as an approximation the following hourly two-way traffic flows are appropriate:

- For the main road, which has a reasonably well maintained road surface and is of adequate width - 1500 vehicles per hour
- For unmetalled access routes that allow two-way operation of traffic – 1,000 vehicles per hour
- For access roads with passing spaces at least every 100m - 500 vehicles per hour
- For access roads with passing spaces less frequently - 250 vehicles per hour

Key data were analysed, and the results are shown in full in Part 4 of the Baseline Reports Appendix. Table 8-15 provides information on the 10 busiest and 10 quietest survey locations, to give an indication of figures encountered.

Table 8-15 Key traffic data for busiest 10 sites and quietest 10 sites

Site and road type	Average daily flow (Vehicles)	Flow composition (%)			Maximum flow Vehicle/hour
		Slow	Light	Heavy	
1 Main	2524	0	77	23	434
4 Access	2408	1	69	29	300
7 Access	47	32	45	23	8
14 Access	44	70	30	0	9
15 Access	44	31	66	4	11
16 Access	2872	12	77	10	746
A28 Access	11	82	0	18	3
A29 Access	20	70	30	0	6
A47&A49 Access E	2857	8	77	15	189
A47&A49 Access W	2557	6	79	15	193
A50 Access (Ganja)	6273	37	58	5	480
A50 Main (Ganja)	4793	8	83	9	497
A51 Access SW	2061	13	77	10	217
A64 Main	2677	14	78	8	280
A70 Access	31	11	81	8	7
A71 Access	39	14	71	15	14
A72 Access	68	7	86	7	10
A76 Access	18	10	77	14	7
A76 Main	29	1	94	6	8
Ganja Main Road	1829	3	88	9	272

8.15.4 Key issues

Key issues relating to traffic conditions in the context of the proposed pipeline are as follows:

- The road network in Azerbaijan is generally poorly maintained, with poor signage, limited lighting and other safety infrastructure
- In some towns and villages, buildings front directly onto the road and street vendors occupy areas of pavement and road

- In rural areas many slow moving road users are encountered such as donkey carts and livestock herds
- Many underpasses beneath the Baku-Tbilisi railway line have limited headroom (Figure 8-25)
- There are several pinch points near the pipeline route including the roundabout in the centre of Kurdemir, sharp bends in streets in the centre of Kazi-Magomed and an underbridge in Randjbar

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9 SOCIO-ECONOMIC BASELINE

9.1 INTRODUCTION

This Section provides an introduction to the demographic, social and economic characteristics of the study area within the national context. This baseline will be used to assess the socio-economic impacts of the project and to compare the effectiveness of the mitigation measures in the future. It provides an overview of the key socio-economic indicators along the pipeline corridor in Azerbaijan, as well as a review of attitudes and expectations, focusing on data from the communities that lie along the route of the proposed pipeline. It also includes an analysis of data relating to communities that are in proximity to a potential camp for construction workers, or a storage yard for equipment.

The information presented has been collated through a series of extensive social surveys conducted by a team of international and national consultants using standard questionnaires, methodologies and tools. Details of this consultation process are presented in Section 16, Consultations. Much of the quantitative information has been sourced through structured interviews with the heads of communities and community representatives in each administrative district of the Azerbaijan BTC/SCP pipelines corridor. Much of the qualitative data have been obtained through interviews with individual households or land users in communities likely to be directly influenced by the pipelines or associated developments. A total of 73 interviews were conducted with community leaders and 814 interviews with community members. Both sets of information have been used to populate a database with responses to around 40,000 questions and a summary of its analysis is presented.

This section is divided into the following sub-sections:

- Background
- Socio-economic baseline
- Project attitudes and perceptions

9.1.1 National context

9.1.1.1 Nagorno-Karabakh conflict

Since the beginning of 1988 a conflict has been enduring between Azerbaijan and Armenia over the disputed area of Nagorno-Karabakh. This conflict has resulted in a considerable refugee crisis, with the number of displaced persons exceeding one million. Although a ceasefire has been in place since 1994, no formal peace agreement has been reached and the situation continues to cause great damage to the country's economic, political and social structure.

9.1.1.2 Oil industry

Since the mid-19th century oil has played an important part in the country's development and its considerable energy resources will play a vital role in its long-term prospects. Production from the Caspian oil and gas fields declined for several years after the collapse of the Soviet

Union, though it has made a considerable recovery in the last few years. This is due partly to the 17 production sharing agreements (PSAs) signed with foreign multinationals that have committed extensive funds to oil field development. These funds are expected to assist future industrial development.

9.1.1.3 The economy

Since independence from the Soviet Union in 1991, transition towards a market economy has been slow:

- Gross domestic product (GDP) dropped by 55% in the 1991-1997 period
- The country has only recently begun making progress on economic reform, with old economic ties and structures slowly being replaced
- The conflict with Armenia over Nagorno-Karabakh has impeded economic development, acting as a disincentive to foreign investment
- The economy is hampered by corrupt practices at all levels of administration. President Aliyev has acknowledged the situation, attributing to “corruption and embezzlement” a fuel shortage in January 2000 which caused major electricity cuts across the country and forced Azerbaijan to import oil from Turkmenistan
- There is a considerable underground economy. The World Bank has estimated that ‘unofficial’ economic activity accounts for half of Azerbaijan’s overall economy

However, with the advent of foreign investment in the oil and gas sector from 1997 onwards, GDP rose by almost 10% in 1998 and such rates of growth have been maintained. In 1999, GDP per capita was US\$508.3. Foreign investment in 2000 was US\$500 million (12% of GDP). Inflation was around 3% in 2001. Among the major foreign investors in Azerbaijan’s enterprises are Turkey (providing 32% of total investment), UK (22%), USA (14%), and France (12%). In parallel with this major foreign investment, Azerbaijan has been attempting to re-focus its trading relationships away from Russia and the former Soviet Republics and towards Europe, Turkey, Iran and the UAE.

The economy is heavily dependent on its oil and gas sector. A serious long-term challenge remains in ensuring the competitiveness of non-oil exports in world markets.

The country’s labour force was 2.9 million in 1997 with 15% in industry and construction, 32% in agriculture and 53% in services (48% of these being in the state sector). 60% of the population is estimated to be living below the poverty line.

9.1.1.4 Agriculture

Agriculture remains an important sector of the economy in Azerbaijan contributing to 20% of GDP, employing 32% of the labour force and providing a livelihood to about half the country's population (Official statistics, 1999). The make up of agricultural production has been stable since 1995 comprising 59% crop-based farming and 41% livestock production. In 1999, national production output increased for cereals, potatoes, other vegetables, watermelons, fruits, teas and livestock (including dairy produce). Output fell in the production of grapes and cotton¹.

Major agricultural cash crops are grapes, cotton, tobacco, citrus fruits and vegetables. The first three crops account for over half of all production, and the last two together account for an additional 30%. Livestock, dairy products and wine and spirits are also important farm products.

In the early 1990s, Azerbaijan's agricultural sector required substantial restructuring:

- prices for agricultural products did not rise as fast as the cost of inputs
- the Soviet-era collective farm system discouraged private initiative
- equipment in general, and the irrigation system in particular, were outdated
- modern technology had not been introduced widely and the administration of agricultural programmes was ineffective

The privatization process in the agricultural sector began in 1996 and has progressed rapidly. Price controls for agricultural products have been eliminated and trade has been liberalized. The system of state and collective farms has been dismantled, and a wide variety of smallholder farming structures have emerged ranging from small family farms to medium-sized companies.

However, the country's primary sector is still far from competitive and many of the food products consumed in Azerbaijan are imported. Furthermore, land productivity was significantly damaged by extensive and uncontrolled use of pesticides and fertilizers during the Soviet period. This has led to severe erosion and salination of soils and chemical contamination of land.

9.1.1.5 Industry

In 1991 the food industry contributed the largest share of Azerbaijan's industrial output, followed by light industry (defined to include synthetic and natural textiles, leather goods, carpets and furniture), fuels, and machine building. Significant food processing and cotton textile operations are located in Ganja in western Azerbaijan, and petrochemical-based industries are clustered near Baku.

Industrial production in Azerbaijan has collapsed to less than one-third of its 1991 level and the composition of industrial output has changed greatly. According to the Statistical Yearbook of Azerbaijan 1999, the production of energy – including fuel and electricity –

¹Azerbaijan Human Development Report, UNDP 2000.

declined much less significantly than production in any other industrial sub-sector, causing a substantial increase in the share of industrial output that arises from energy production (from 16% in 1990 to 68% in 1998). The fuel industry alone has accounted for more than half of the total value of industrial production for the past three years. At the same time, all other industrial output has continued to decline. For instance, light and machinery industries each accounted for nearly 20% of industrial production in 1990 but now represent only 2.5 and 3.3% respectively.

9.1.2 Administrative structure

The Head of State of the Republic of Azerbaijan is President Heydar Aliyev.

The Republic of Azerbaijan is a secular democracy with the Government based on the separation of powers between three branches:

- Legislative power (the Milli Mejlis of the Republic – Parliament)
- Executive power (the President of the Republic)
- Judicial power (Courts of the Republic)

The country is divided into 78 semi-autonomous administrative districts, 65 of which are rural and 13 urban. There are a total of 69 towns and cities.

The Constitution, adopted by National Referendum in 1995, provides for the separation of powers between central and local authorities. It mandates the creation of the municipal bodies as a locally elected third tier of government. These municipal bodies have authority over local taxation and budget, the possession and use of municipal property and local programmes for social protection, economic development and environmental protection. There are generally several municipalities within each administrative district.

The last Presidential elections were held in 1998 and parliamentary elections in 2000. Municipal elections were held in December 1999.

At the village level there is a locally elected municipal representative as well as a representative of the executive power (who is not elected). There is also usually a village council in each community, which reports to the Head of the Executive Committee of the administrative district.

9.1.3 The survey area

In Azerbaijan the proposed pipeline route crosses a total of 12 administrative districts, of which 11 have affected communities. Within these districts, a total of 83 communities have been identified as being located within (or partly encroach into) a 4km corridor centred on the route, or are close to a potential construction camp or pipe yard. These are considered by the project as pipeline-affected communities. A summary of information on these communities can be found in Appendix Volume 2 part 11. In addition villages within 100m of an access road to the ROW will also be considered as pipeline-affected communities. The latter will be identified when the information is available. Mitigation measures in Section 11. Socio-Economic Impacts and Mitigation, have been designed to minimise the impacts on these pipeline-affected communities.

Table 9-1: Administration districts and population

Approximate KP Point	Districts
0-8	Garadag (not included in the baseline survey)
9-40	Absheron (not included in the baseline survey)
41-95	Hadgiqabul
96-140	Kurdemir
141-195	Ujar
196-215	Agdash
216-250	Yevlakh
251-292	Geranboy
293-320	Samukh
321-360	Shamkir
361-385	Tovuz
386-442	Akstafa

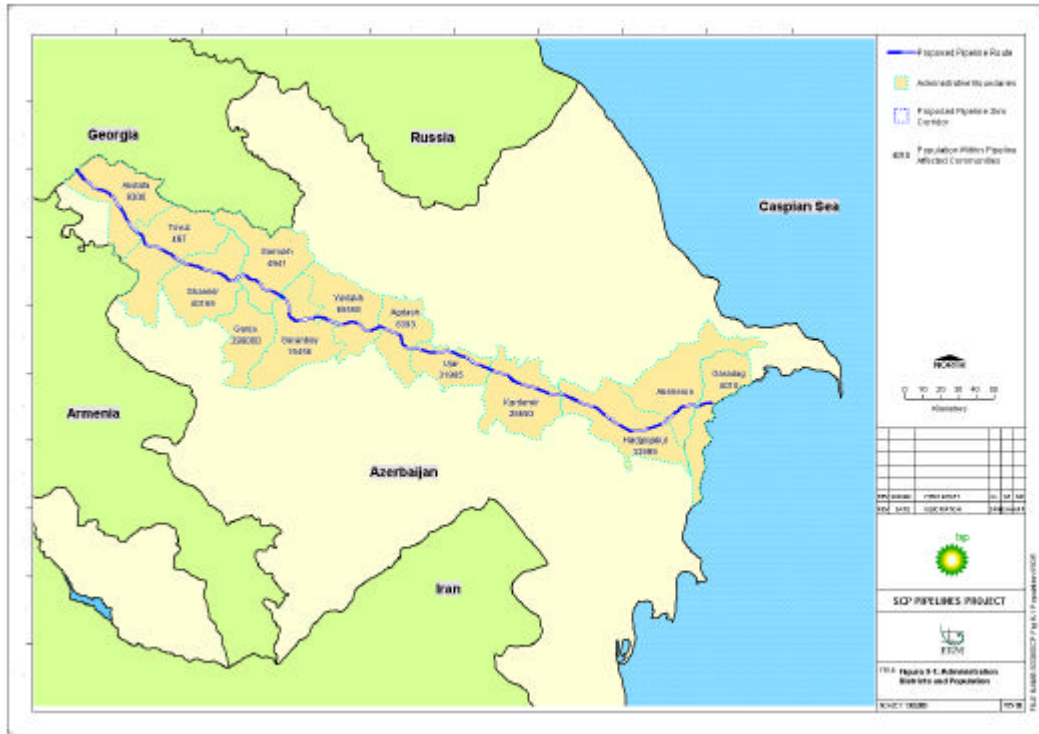
Due to changes in the pipeline route and decisions that have yet to be made in terms of access road locations, in addition to identification of land ownership, the communities surveyed during the compilation of baseline information, do not correlate exactly with the communities defined as directly affected. 71 (or about 90%) of the communities located within the 4km corridor are however included in the baseline survey. A list of these can be found in Appendix Volume 2 part 11. The methodology for how these surveys were conducted can be found in Section 7, ESIA Methodology. Additional testing of mitigation measures and the collection of basic information from any remaining communities will be conducted during the disclosure phase.

The districts of Garadag (where household interviews were conducted to ascertain perceptions about a pipe yard near the community of Sangachal), Absheron, and Ganja (where household interviews were conducted to ascertain perceptions about a construction camp and a pipe yard close to the city of Ganja) have also not been included within the overall baseline analysis. In the case of Ganja this is because the corridor does not pass through the district. Garadag is not included in the analysis because it is included within the assessment of BP's upstream oil development activities. Absheron is not included in the analysis as there are no communities within 2km of the pipeline route. This means that survey data cover 10 districts instead of the 12 through which the pipeline passes. However, data from both Ganja and Garadag district are included in the analysis of information and development of mitigation measures that specifically relate to the management of yards and camps.

Within the corridor the majority of locations visited are villages, however there are also several towns and 'large' villages with a population of over 5,000 as well as migratory communities such as herders. The large towns include Kazi-Magomed (KP51-55), Aran (KP242-244), Yevlakh (KP 225-235), Ujar (KP172-178) and Kurdemir (KP128-132). For simplicity, all of the locations visited are referred to as communities throughout this report.

Figure 9-1 shows the pipeline route, as well as population centres within the study area.

Figure 9-1: Administration districts and population



9.2 POPULATION DISTRIBUTION AND DEMOGRAPHICS

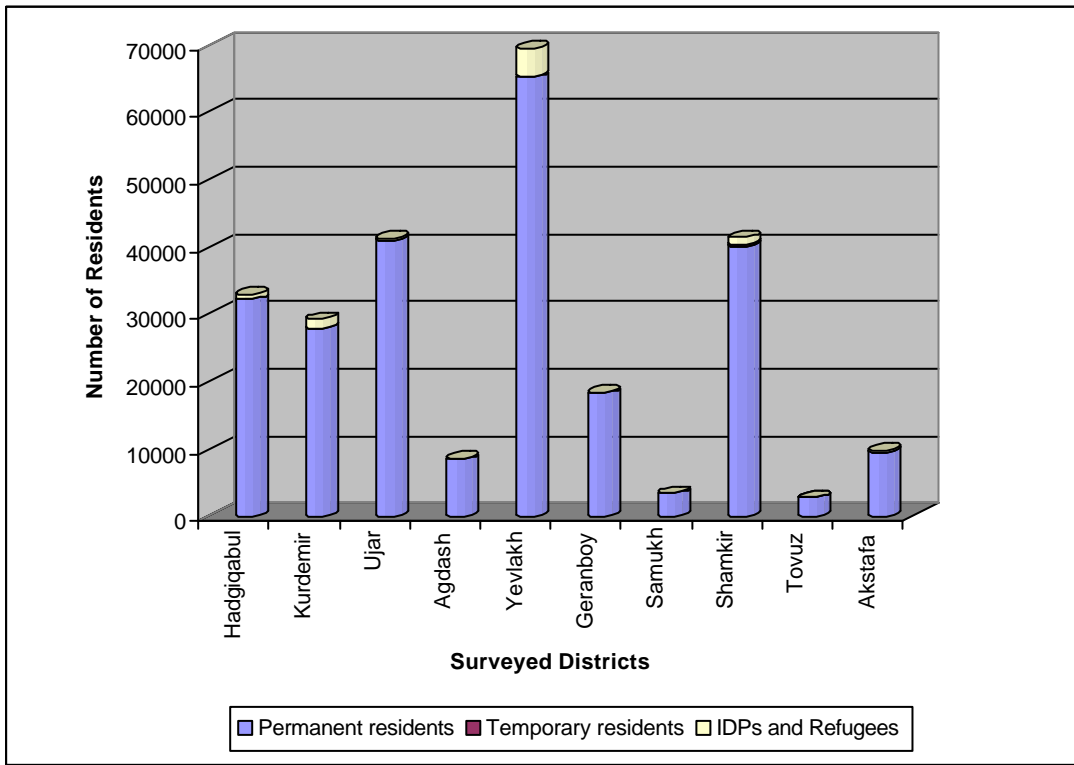
9.2.1 Population and migration

According to official statistics (1 January, 1999) the total population of Azerbaijan is 7,949,300 of which 52% reside in urban areas and 48% in rural areas. The continuing occupation of one-fifth of the territory of Azerbaijan by Armenia has left the country with over one million Internally Displaced Persons (IDPs) and refugees. These people are dispersed throughout the country with just under half of them in rural areas. The Republic also includes the Nakhchivan Autonomous Republic (population 354,000 people), separated from the rest of the country by the territory of Armenia.

The total population of all the communities surveyed along the BTC/SCP pipeline route is 257,223, of whom just over 96% are permanent residents, 0.3% temporary residents, and 3.3% IDPs and refugees (see Figure 9-2). The total population of all the communities in the wider survey area (which includes settlements close to pipe yards and construction camps) is 593,016 (this difference is mainly due to the inclusion of Azerbaijan's 2nd largest city – Ganja).

Refugees and IDPs are found predominantly in the districts of Yevlakh (49%), Kurdemir (17%) and Shamkir (12%). 58% of the total number of temporary residents in the corridor (ie, 300 people) are in the Shamkir district in Western Azerbaijan (see Figure 9-2).

Figure 9-2 District population structure



The average size of villages has increased over the past decade largely due to in-migration. In addition to IDPs and refugees, the displaced population in Azerbaijan includes nearly 50,000 Meskhetian Turks². Most of these refugees came to Azerbaijan in the early 1990s to escape ethnic conflict in Uzbekistan.

According to Government statistics about one-quarter of the total number of IDPs and refugees live with friends and relatives, while the remainder live in tent camps, public buildings (such as schools), partially constructed buildings, tourist and health facilities, railway wagons and other temporary settlements in existing Azeri villages.

“Young people move to Russia to get jobs as there are no employment opportunities in the village”. (Agdash District, Amirarh Village)

“It is hard to find work in the village. There is no work. Many young people have left to find work in Russia. Some stay there only temporarily but others reside permanently.” (Shamkir region, Dallyar Djeir Village)

“Even though quite a few people left the village because of no water and gas supply, the population still has grown.” (Agdash District, Hanitlu village)

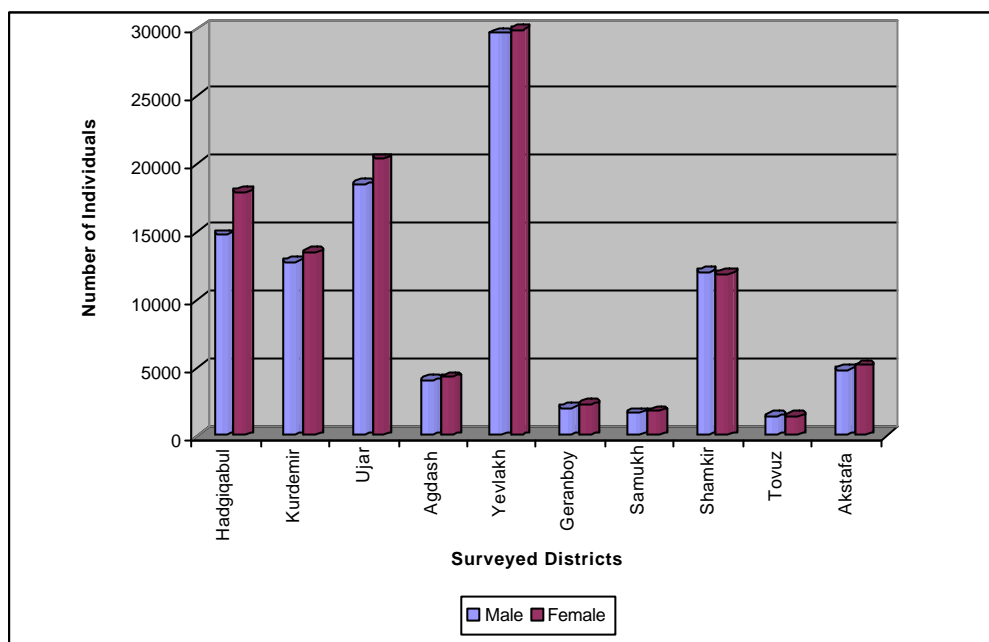
9.2.2 Gender distribution

Gender issues are very important indicators of human development, in relation to employment opportunities. The female population slightly exceeds the male population in communities along the pipeline route. This is caused by the fact that, in many communities, men have migrated to Russia or Baku to look for employment.

Figure 9-3 depicts gender distribution for each district along the corridor. This is representative of the national average.

² See Footnote 4.

Figure 9-3 Gender distribution in each district in the surveyed area



In Azerbaijan, women and men possess equal rights and liberties under the constitution. The country's labour law also explicitly prohibits wage discrimination on the basis of gender.

Nevertheless, while gender disparities are minimal in health and education, current wage and employment profiles show women to be at a clear disadvantage³. Gender inequalities persist with regard to economic empowerment. Women's employment is concentrated in lower-paying sectors of the economy and women are poorly represented at the higher levels of management, even in sectors that employ predominantly women. For example, women account for more than two-thirds of employment in health, education and cultural work where remuneration levels are particularly low. However, they represent only about 35% of the heads of clinics and polyclinics and less than 20% of management in the education system. The average wages paid to women are lower than those paid to men in all sectors. Unemployment is likely to be a particular issue among women. Government statistics show that women accounted for about 60% of the registered unemployed throughout the 1990s³.

9.2.3 Age distribution

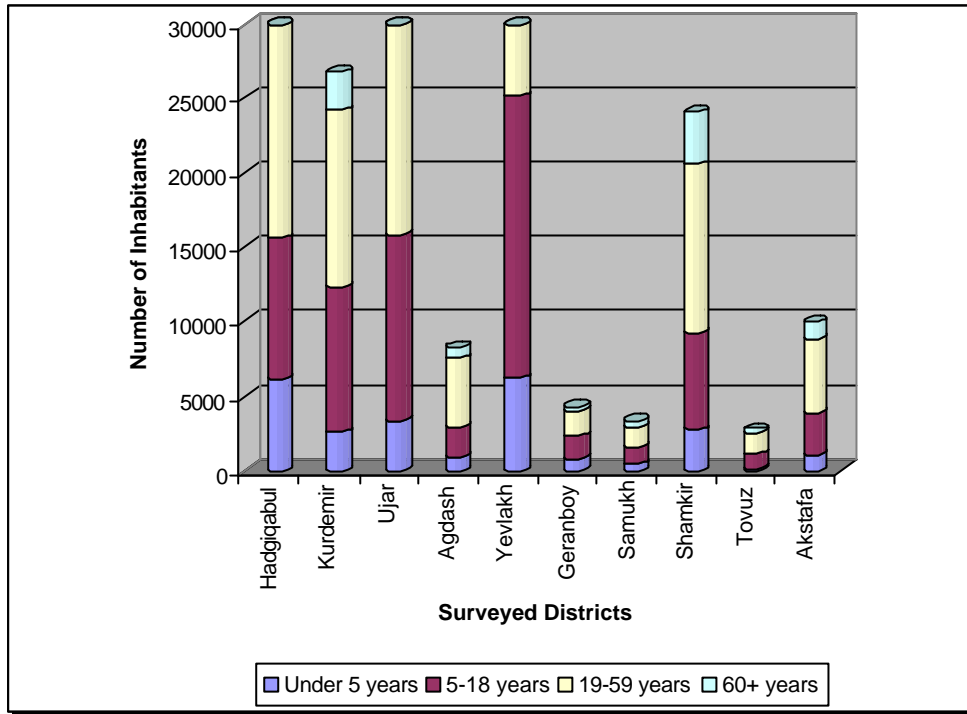
Figure 9-4 shows the age distribution of the population. The age distribution of the male and female population is very similar, and has been combined. The data are based on statistics and verbal information from government officials at the district centres and from the heads of 58 communities out of the 74 community leaders interviewed. The survey team was unable to obtain population distribution data for the remaining 16 communities. Partial data only are therefore presented for the following districts: Ujar (77%), Yevlakh (57%), Geranboy (54%)

³Azerbaijan State Statistics Committee, Women and Men in Azerbaijan, 1999.

and Shamkir (64%). Consequently, although the distributions in Figure 9-4 are illustrative of each district, the absolute numbers of population for these four districts are incorrect.

Working age is taken to be from 19 to 59. Figure 9-4 demonstrates that the working age group is the largest age group in all districts.

Figure 9-4 Age distribution of population by district



9.2.4 Religion and ethnicity

Azerbaijan has a very homogeneous religious and ethnic society. 99.5% of the population are Muslims and 0.5% are either Orthodox Christian or Jewish. 91% of the population are of Azeri origin. Table 9-2 shows the total numbers of minority groups in Azerbaijan⁴.

Table 9-2 Total numbers of minority groups

Ethnic Origins	Population
Lazs	178,000
Russians	142,000
Armenians	121,000
Talish	77,000
Avars	51,000
Turkish	43,000
Tatarian	30,000
Ukrainians	29,000
Sakhur	16,000
Georgians	15,000
Kurds	13,000
Tats	11,000
Jews	9,000

⁴ This table has been sourced from official statistics, however it does not mention the presence of Meskhetian Turks. Other sources suggest there are up to 55,000 Meskhetian Turks refugees in Azerbaijan and fieldwork suggests that approximately 50% of the community of Sary Tepe (community population 510) are Meskhetian Turk..

Udins	4,000
-------	-------

Table 9-3 shows where the small ethnic and religious minority communities are located along the BTC route. The largest non-Azeri populations are found in Yevlakh district although this is representative of the larger relative population of the district. Azeri citizens have been granted the right within the Constitution to practice any religion freely.

Table 9-3 Ethnicity and religion along the route

District	Ethnic structure			Religious structure		
	Azeri	Russian	Other	Muslim	Christian	Other
Hadgiqabul	29443	350	104	29547	350	0
Kurdemir	22356	21	5	21266	20	0
Ujar	41471	343	1	41486	342	0
Agdash	8395	10	1	8395	11	0
Yevlakh	57530	224	798	58239	310	27
Geranboy	13707	10	7	17166	14	0
Samukh	2741	1	249	2854	2	0
Shamkir	39831	65	484	40340	68	3
Tovuz	2774	0	0	2774	0	
Akstafa	9509	27	97	9770	89	0

9.2.5 Public health

A lack of attention to the health sector has resulted in deteriorating medical buildings and equipment, and the near collapse of emergency services and primary care in most rural areas⁵. The quality of health care in Azerbaijan is also hindered by a complex, hierarchical and inefficient network of medical structures within the public sector, for which funding has been decreasing over the last 10 years. Access to health care is no longer free or universal. Almost 95% of medicine, medical equipment and supplies are now provided through international humanitarian assistance. The weakness in the public health system and the persistence of poor standards of living are reflected in the poor health status of the population. Rural communities have suffered the biggest decline in health care standards.

Additional factors impacting the poor health status of communities include:

- local industry and the associated industrial discharges and municipal sewage
- the absence of central sewage collection and treatment facilities in most communities
- high precipitation, which causes the contamination of surface and groundwater bodies by sewage, domestic and industrial wastes. This is a particular problem in the area between Kazi-Magomed and Yevlakh, where cases of malaria and anthrax were reported in 1996

⁵ Two published sources have provided much of the national level data in this section: Dr Vladimir Verbitski, WHO Regional Office for Europe in Azerbaijan, and Dr Richard Zalesky, Head of the Chair of Tuberculosis of the Latvian Medical Academy. Article published in Azerbaijan International (3.4) Winter 1995; and Dr Irada Yusifli, The Return of Infections and Contagious Diseases, published in Azerbaijan International, (3.4) Winter 1995.

Average life expectancy at birth in Azerbaijan is 71.6 years (75.1 years for women and 68.1 years for men).

The infant mortality rate is 16.5 per 1,000 live births. This figure does not seem extraordinarily high by international standards. However, Azerbaijan's official definition of live births excludes many infants who die in the first seven days of life, resulting in an infant mortality rate that is 25-30% lower than the level that would be found if the World Health Organization's (WHO) definition of live births were used. In addition, deaths following home deliveries are less likely to be reported and many deliveries now take place at home.

The leading causes of mortality in Azerbaijan are (1) cardiovascular disease, (2) cancer and other tumours, (3) respiratory infections, and (4) traumas and poisonings⁶. Alcoholism, smoking, environmental contamination, diet and lifestyle are also serious health concerns. Diarrhoea is highly prevalent among children, particularly children of the displaced, and the past decade has seen major outbreaks of measles and diphtheria. Inadequate shelter and a shortage of anti-malarial drugs and insecticides necessary for malaria control have allowed a resurgence of malaria in some districts. Insufficient supplies of anti-thyroid drugs and iodination have led to a high incidence of iodine deficiency disorder, which is associated with goiter and mental retardation⁷. 18 community leaders (24% of the total) mentioned psychological stress as one of the key causes of health deterioration. Eight of these leaders were in the Ujar district.

Additionally, the incidence of communicable diseases is increasing despite having been successfully reduced during Soviet times. In particular cases of diphtheria, tuberculosis, hepatitis A, diarrhoea and acute respiratory infections are all important public health problems.

9.2.5.1 Malaria

The most common form of malaria in Azerbaijan is vivax malaria, which is responsible for milder disease forms (ie, is not commonly lethal).

Twenty years ago malaria was virtually eradicated from Azerbaijan. However, there was an alarming upsurge in cases during the mid-1990s. This was reversed through the efforts of a public-private partnership brokered in 1998 by the Roll Back Malaria global partnership.

9.2.5.2 Anthrax

Anthrax occurrences in humans in Azerbaijan between 1992 and 1996 are indicated in Table 8-4. The disease is treatable with antibiotics, but these must be started early in the infection. If anthrax remains untreated it can be fatal. There have been reports of anthrax affecting

⁶ <http://www.icrc.org>

⁷ Azerbaijan Human Development Report, UNDP 2000.

areas of the BTC pipeline route in Azerbaijan in 2000/2001, however, no further information is currently available on these outbreaks.

Table 9-4 Anthrax cases in Azerbaijan

Year	Number of cases of human anthrax
1992	33
1993	55
1994	50
1995	45
1996	76

9.2.5.3 Cholera

In recent years, there have been a number of recorded outbreaks of cholera in the Former Soviet Union (FSU), including the north Caucasus area.

9.2.5.4 AIDs/STDs

HIV/AIDS and STD incidences are increasing in Azerbaijan with only seven cases registered between 1987 and 1992, but 164 HIV cases confirmed by January 2000⁸. The real statistics are likely to be much higher as many cases go unreported. Baku has an HIV/AIDS Resource Centre.

9.3 LIVELIHOODS

The income level of most Azeri households remains low, though several indicators suggest that real household incomes have increased in recent years. In 1999 and 2000, salary increases in some sectors have led to an increase of 16.4% in real incomes. In 2000, the average income was 203,400 manats per month⁹ (US\$46). In rural communities, household incomes are considerably lower than the national average. Rural salaries tend to be 20-30% higher where cattle breeding has developed, compared with areas engaged primarily in cultivation activities⁷. The main types of household expenditure are shown in Figure 9-5.

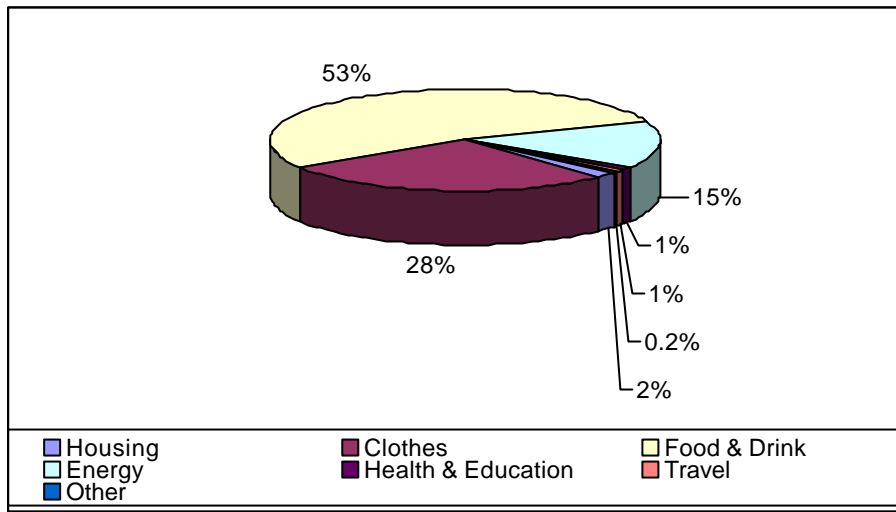
The value of pensions varies according to the recipient's work experience. In addition, pensions are higher for women who have many children or disabled children. Currently the minimum pension is 70,000 manats¹⁰ per month (about US\$14.50).

⁸ Field Report, Joint UN Project to prevent STDs and HIV/AIDS in Azerbaijan, March 2000.

⁹ Azerbaijan Human Development Report, 2000

¹⁰ Azerbaijan's President Order, 26 December 2001

Figure 9-5 Main items of household expenditure in the surveyed area



Changes in household consumption patterns during the 1990s reveal that standards of living have fallen. Also, these changes reveal that households have concentrated their expenditure on food products, as prices have risen, and reduced their purchasing power. The ability to pay for other goods and services – such as medical care, education, clothing and recreation – fell sharply after the transition from communism began. According to national government statistics, households spent less than half of their incomes on food products in 1990 but have spent nearly 70% on food every year since 1994¹¹.

9.3.1 Employment

National average unemployment was estimated to be around 25% in 2000, and up to 50% in some districts. The problem of unemployment is particularly serious for those aged between 18-30, as well as for IDPs and refugees. With such a high proportion of the population seeking work, wage levels remain low and working conditions are extremely poor¹².

Substantial labour migration to Russia has been observed in recent years. Data on numbers of migrant workers were collected from communities along the pipeline corridor, and are shown in Table 9-5. The total number of migrant workers along the corridor is 8,803 people. The largest proportion of people leaving in search of employment was from the Yevlakh district (2,530 people; 29% of the total number of migrant workers along the route).

¹¹ *Azerbaijan Economic Trends*, March 1999

¹² *Azerbaijan Human Development Report*, UNDP 2000

Table 9-5 Total numbers of migrant male workers, by district

District	Number of migrant workers
Hadgigabul	530
Kurdemir	480
Ujar	1550
Agdash	272
Yevlakh	2530
Geranboy	650
Samukh	161
Shamkir	2085
Tovuz	150
Akstafa	395

All communities surveyed stated that they had members who would be available for temporary work. This demonstrates that large numbers of working-age people are actively searching for work along the pipeline corridor. People with useful skills (engineers, drivers, welders, etc) were reported to exist in every community. Communities close to potential construction camps also reported the availability of workers skilled in catering, laundry, cleaning, food production, etc.

9.3.2 Source of livelihoods

According to the data obtained from government officials in the district centres and towns, crops and animal husbandry are the main sources of cash income along the pipeline corridor. This income is supported by the following secondary sources:

- State budget, e.g, teachers, doctors, government administration and other state sector jobs
- Material aid - provided by international NGOs and the State to IDPs and refugees
- Social transfers - state pensions, benefits, etc
- Hunting, fishing and gathering
- Trade - including local shops and businesses (70% of communities have at least one shop or market)

Table 9-6 presents data on income sources in each district, as reported by community leaders.

Table 9-6 Income sources by district

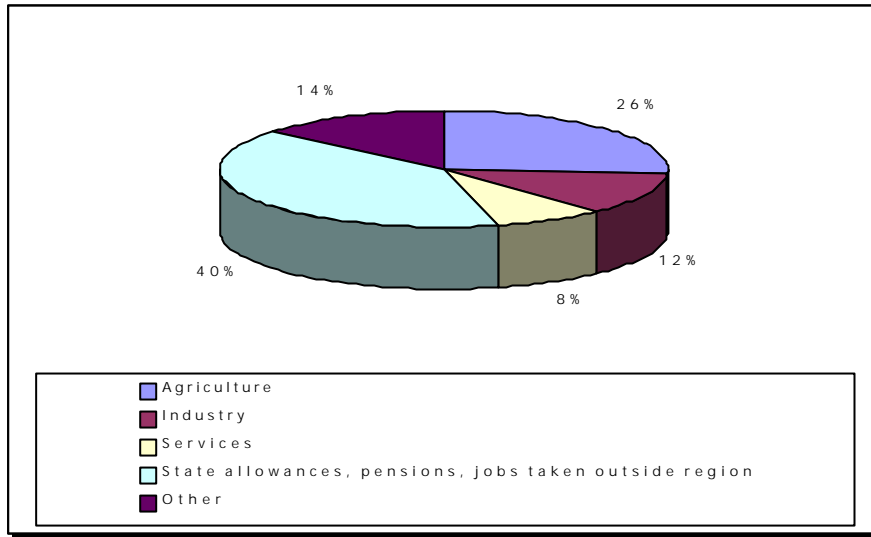
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AZERBAIJAN
DRAFT FOR DISCLOSURE

District	Approx KP	Main sources of income	Secondary source of income
Hadgiqabul	41-95	Animal husbandry	Crops Industry Trade State budget Material aid Social benefits Humanitarian aid
Kurdemir	96-140	Crops Animal husbandry	Trade State budget Material aid Social benefits
Ujar	141-195	Crops Animal husbandry Hunting, fishing, gathering	Trade State budget Material aid Social benefits Humanitarian aid
Agdash	196-215	Crops Animal husbandry Hunting, fishing, gathering	Trade State budget Material aid Social benefits
Yevlakh	216-250	Crops Animal husbandry	Industry Trade State budget Material aid Social benefits Humanitarian aid
Geranboy	251-292	Crops Animal husbandry	Trade State budget Material aid Social benefits Humanitarian aid
Samukh	293-320	Crops Animal husbandry	Trade State budget Material aid Social benefits Humanitarian aid
Shamkir	321-360	Crops Animal husbandry Hunting, fishing, gathering	Industry Trade State budget Material aid Social benefits Humanitarian aid
Tovuz	361-385	Crops Animal husbandry Hunting, fishing, gathering Social benefits	Industry Trade State budget Material aid

District	Approx KP	Main sources of income	Secondary source of income
Akstafa	386-442	Crops Animal husbandry Hunting, fishing, gathering Social benefits	Industry Trade State budget Material aid Humanitarian aid

The data presented in the above table are not fully supported by the results of interviews with individual householders (Figure 9-6). Householders report that the main income source derives from state allowances/pensions or jobs taken outside of the district (generally in Russia or Baku by male members of the family).

Figure 9-6 Main source of income reported by individual households in the surveyed area



9.3.3 Agricultural production

Data obtained from government officials show that in nine of the districts along the pipeline corridor, vegetable cultivation is the largest component of all agricultural production. The exception is Samukh district, where the population is primarily engaged in animal husbandry and growing grapes and grain. Some communities also have beehives, however these are maintained for personal consumption and occasional sales rather than as a source of livelihood.

Overall, 86% of the total number of communities is engaged in vegetable cultivation, 57% in growing grain and almost all of them in small amounts of animal husbandry. Most households will have one or two cows and a small number of sheep and poultry for subsistence purposes (wool, milk and meat). In general there is one fruit harvest per year, however in the central districts, there can be two crops grown each year. The first is generally a food production crop and the second is winter animal feed (hay). In other areas there is only one harvest per season. Modern farm machinery tends to be owned by one of the wealthier landowners in the area and is rented out to other farmers as needed (or afforded). Farming machinery in general does not reach deeper than 20cm.

A significant portion of Azerbaijan's fruit output is destined for export to Russia, particularly pomegranates, watermelon and quince. Communities will often pool their produce to be taken to Russia as one load. Alternatively, larger landowners will make trips to Russia to sell their produce on their own.

Structural bottlenecks continue to impede agricultural productivity. Private landholders do not have good access to the inputs, services and know-how that would maximise their output. Most important among these are the lack of rural financing, the poor condition and management of the irrigation system and the absence of extension and support services. The Government recognizes many of these problems and a Presidential Decree on Measures to Accelerate the Reforms in the Agricultural Sector has been issued to rectify them (March 1999).

In addition, much of the agricultural land is located far from people's homes and there is little transport available to communities to reach distant land plots.

"Our concern is that if the pipeline goes through our farmland it might decrease the available arable area..." (Agdash District, Amirarh Village)

"One can grow everything here from wheat to cotton, but there is no money for that. There is no money for livestock breeding either." (Ujar District, Anver Memmedhanly)

"Villagers don't grow anything on the farmland because there is no water. All they grow is fruit in backyard gardens." (Kurdemir District, Chokhranly Village)

"There is not enough water to farm the land. People only have enough to grow vegetables in their backyard plots." (Shamkir Region, Dallyar Dashbulak Village)

9.3.4 Seasonal grazing

During the winter season, municipal and state land is frequently used by migratory sheep herders as winter grazing grounds. In summer, these herds are moved to the more mountainous northern districts of Azerbaijan where the traditional homes of the herders are located. From October to December herds are moved to lower pastureland across the central corridor area of Azerbaijan, along the pipeline route. The herds are driven north again from mid-May to July. One thousand sheep plots are allocated each year to herder groups. Herders work within a hierarchy often based on family relationships. They maintain communication with each other using mobile phones.

While there are official migratory routes, other informal routes are also established each year. These will track along rivers, access roads, etc, as necessary to reach preferred grazing areas. The pipeline route frequently crosses potential herders' grazing areas.

Table 9-7 Communities along the ROW where winter grazing is carried out

Communities on Pipeline Route	Number of Grazing Grounds (approx)	Estimated Number of Sheep
Hadgiqabul including Randjbar Qarasu Mugan Padar	100	180,000
Kurdemir, including Sigirly	30	30,000
Ujar, including Alpout	7	10,000
Agdash None of communities along corridor appear directly involved	13	10,000
Yevlakh None of communities along corridor appear directly involved	50	50,000
Geranboy, including Jinli Boluslu Borsunlu	22	90,000
Samukh Specific communities not known	82	60,000
Shamkir Specific communities not known	11	100,000
Tovuz None of communities along corridor appear directly involved	14	117,000
Akstafa None of communities along corridor appear directly involved	29	225,000

9.3.5 Land ownership

The privatization process in the agricultural sector began in late 1996 and has progressed rapidly. Some state and co-operative farms are still in operation in Azerbaijan, with little actual difference between the rights and privileges of state and co-operative holdings. However, many of the collectives and state-owned farms have been privatized under the 1996 'Law on Land Reform', and about 36,000 small farms were estimated to be in private hands at the beginning of 2000 ¹³.

Across the surveyed districts, the share of land that is privately owned ranges widely. Table 9-8 presents data on the variations of land ownership across the districts obtained by the BP

¹³ Azerbaijan Human Development Report UNDP 2000

lands team. The lands team has also compiled a list of potentially vulnerable landowners which includes female-headed households, elderly landowners, IDPs/refugees and invalid or disabled land owners.

Table 9-8 Land ownership by district

DISTRICT	STATE %	MUNICIPAL %	PRIVATE %
Hadqiqabul	67	23	10
Kurdemir	12	23	65
Ujar	5	50	45
Agdash	10	41	49
Yevlakh	7	33	60
Geranboy	3	24	73
Samukh	4	18	78
Shamkir	2	24	74
Tovuz	4	14	82
Akstafa	37	20	43

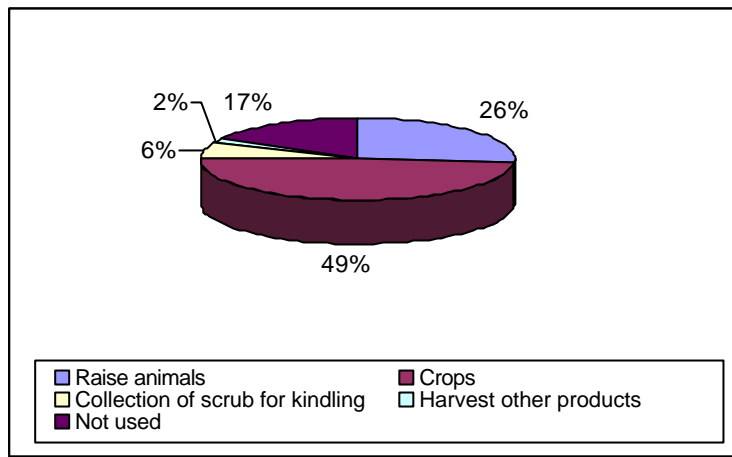
Azerbaijan's land reform and privatization programme failed to take into consideration the distribution of machinery and maintenance of irrigation channels, and these networks have fallen into the hands of individuals who now charge high prices for their usage.

Irrigation is essential for much of the land along the pipeline route. Many farmers living within the pipeline corridor can no longer afford to pay for irrigation and therefore have difficulties working their land. Instead, they are renting their land out to richer farmers who have access to machinery and water. Other farmers are not interested in cultivating their land because of poor soil quality. They prefer to raise poultry (ducks, turkeys or geese) and if possible, cattle and sheep, since grazing does not require the high maintenance of crops. Farmers along the route can therefore be divided into the following groups in accordance with their land use priorities:

- people using their land:
 - for their own needs only
 - as their main source of income
- people who don't use their land:
 - for economic reasons, ie, they can't afford it
 - because they lack agricultural skills
 - because they received land plots with bad soil during the land allocation process

While 95% of people interviewed have their own land only 50% use this for cultivation, and 17% do not use their land at all (due to water shortage, lack of good facilities or other reasons - see Figure 9-7).

Figure 9-7 Land use in the surveyed area



9.3.6 Industrial, commercial and public sector employers in the communities

There are a number of industrial facilities located along the pipeline corridor as follows:

- Kurdemir – cotton refinery plant
- Ujar – cannery plant, cotton refinery plant and concrete manufacturing plant
- Agdash – cotton refinery plant and plastic materials factory
- Yevlakh – grain processing factory, tobacco factory, cotton refinery plant, wool factory and tractors repair plant
- Shamkir – winery plant

Generally, these facilities are either non- or semi-operational and 80% of all respondents stated that there were no industrial facilities in their community. Other commercial ventures in the communities surveyed are shops, hairdressers, cafes, shoe-repair workshops, furniture workshops, etc. See Figure 9-8 and Table 9-9 for a breakdown by district.

Public sector employers in the communities include health facilities (present in 43% of the surveyed communities) and post offices (present in 32% of the surveyed communities).

Figure 9-8 Total numbers of commercial employers in the surveyed area

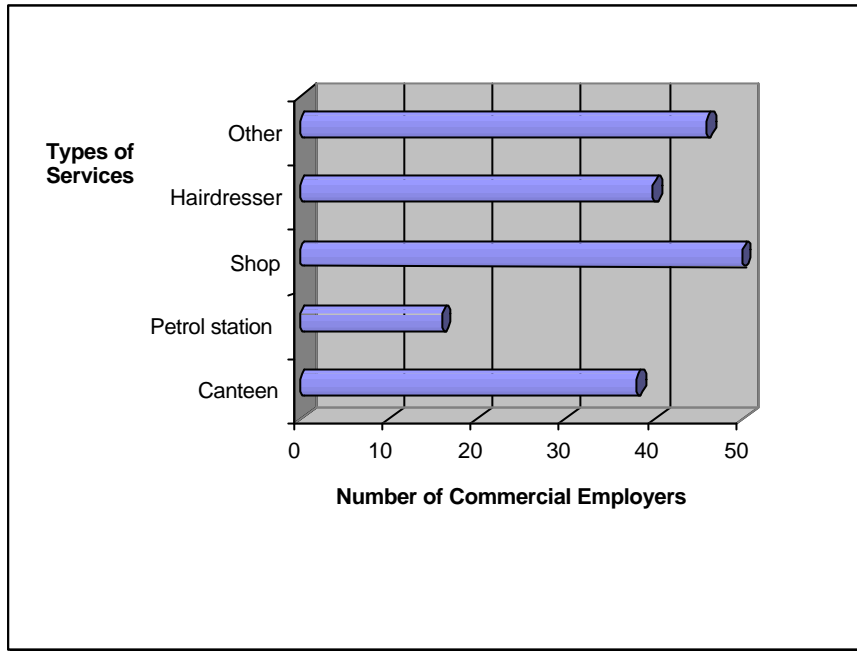


Table 9-9 Numbers of commercial facilities in impacted communities, by district

District	Approx KP	Cafe	Petrol station	Shop	Hairdresser	Other
Hadqiqabul	41-95	3	2	4	5	2
Kurdemir	96-140	3	3	4	3	5
Ujar	141-195	8	2	10	6	9
Agdash	196-215	1	0	5	0	4
Yevlakh	216-250	7	1	6	5	5
Geranboy	251-292	5	1	5	8	8
Samuh	293-320	2	0	2	2	3
Shamkir	321-360	7	4	7	7	8
Tovuz	361-385	0	1	1	1	0
Akstafa	386-442	2	2	6	3	2

9.4 INFRASTRUCTURE, RESOURCES AND SERVICES

In general, infrastructure and services in the survey area have suffered from poor maintenance and a lack of investment.

9.4.1 Energy

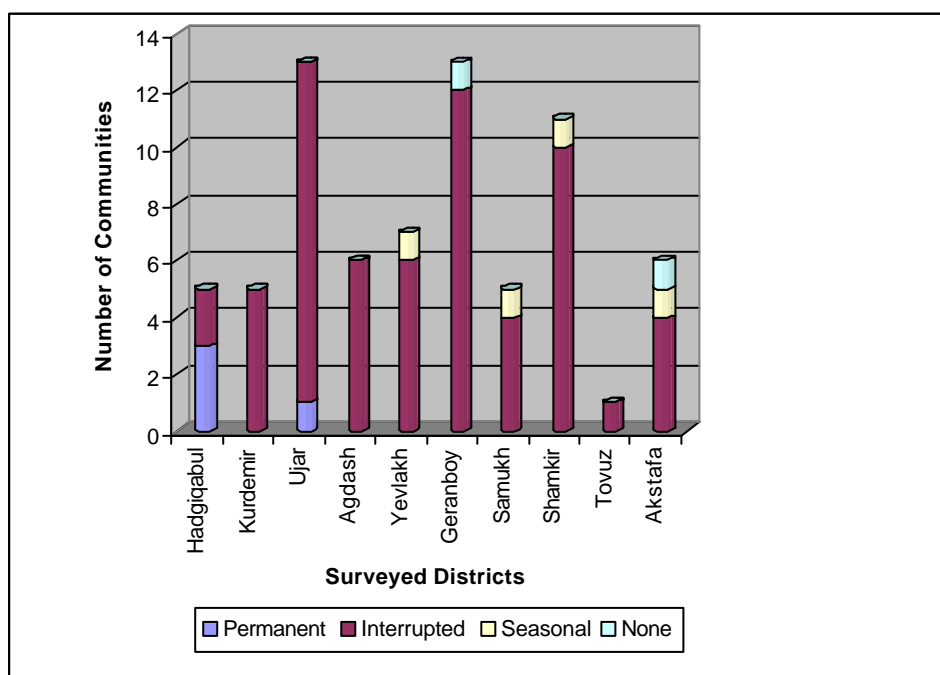
Access to energy is poor along the proposed pipeline route in general. This is mainly because of insufficient availability of power, particularly in winter when national demand increases approximately two-fold. However there are other factors as well:

- There is an element of termination/interruption to supply due to non-payment - collection rates in rural areas are very low. Reasons for non-payment include:
 - People do not have the money to pay
 - The transition from an expectation of free gas to one of payment for services used is in its early stages
 - The metering system is obsolete and generally does not allow accurate calculation of individual consumer consumption. This situation is currently changing within the Baku area, and can be expected to gradually extend to rural areas.
- Obsolete power transmission accounts for extensive power losses.
- Lack of efficient management within the payment collection and fuel distribution system hinders both the ability to generate power and make improvements to the existing power infrastructure.

9.4.1.1 Electricity

Hadqiqabul and Ujar are the only districts where some villagers have a continuous supply of electricity. For 62 communities (84% of communities or 89% of people) electricity is only available for a few hours a day. There is no electricity at all in two communities (Yolpak and Zelimhan villages) of the Geranboy and Akstafa districts respectively. Figure 99 shows electricity availability by district.

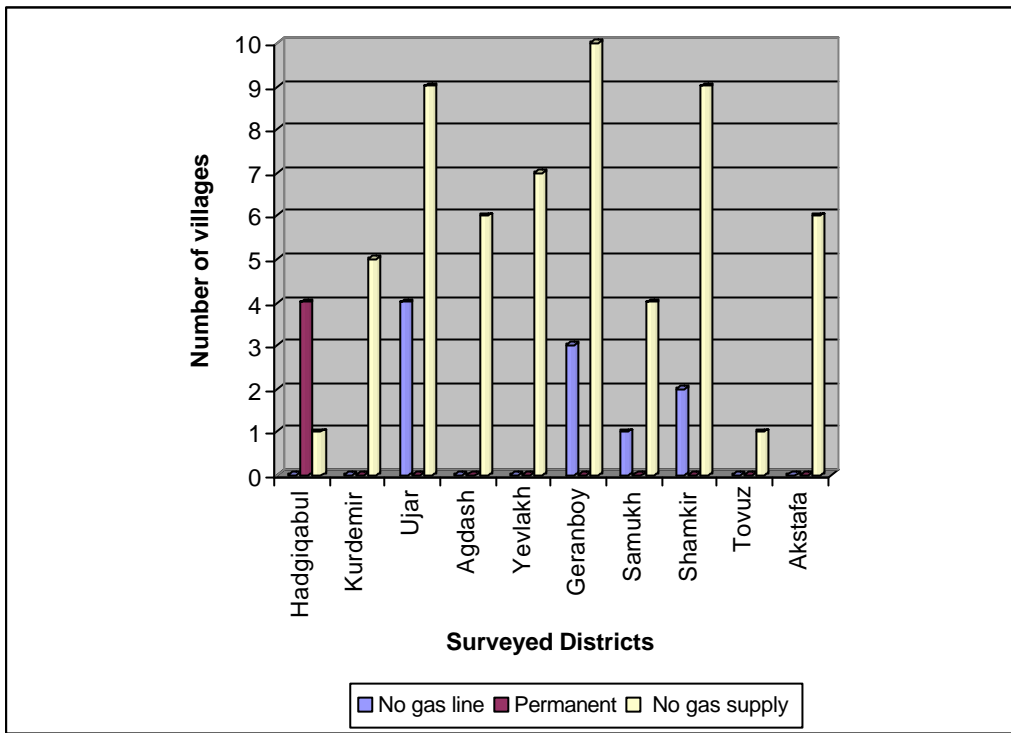
Figure 9-9 Numbers of communities and electricity supply, by district



9.4.1.2 Gas

Gas is used for heating and cooking purposes where it is available. Gas supply infrastructure exists in 85% of communities surveyed, though supply for the last few years has been limited and the infrastructure is badly deteriorated. As a result, only four communities (in the Hadgiqabul district) have a permanent supply of gas. 58 communities have no gas supply at all. Figure 9-10 shows the availability of gas by district.

Figure 9-10 Gas supply by district



65% of people interviewed stated that lack of gas is a problem. In the absence of piped gas, gas canisters are widely used in all districts. 64 communities purchase gas canisters because of their local availability and relative low cost compared to other fuel sources.

“Due to intermittent power supply people sit in the dark at nighttime.” (Agdash District, Amirarh Village)

“The biggest problems in the village are unemployment, absence of gas, and limited power supply.” (Akstafa District, Ashagy Kesamanly Village)

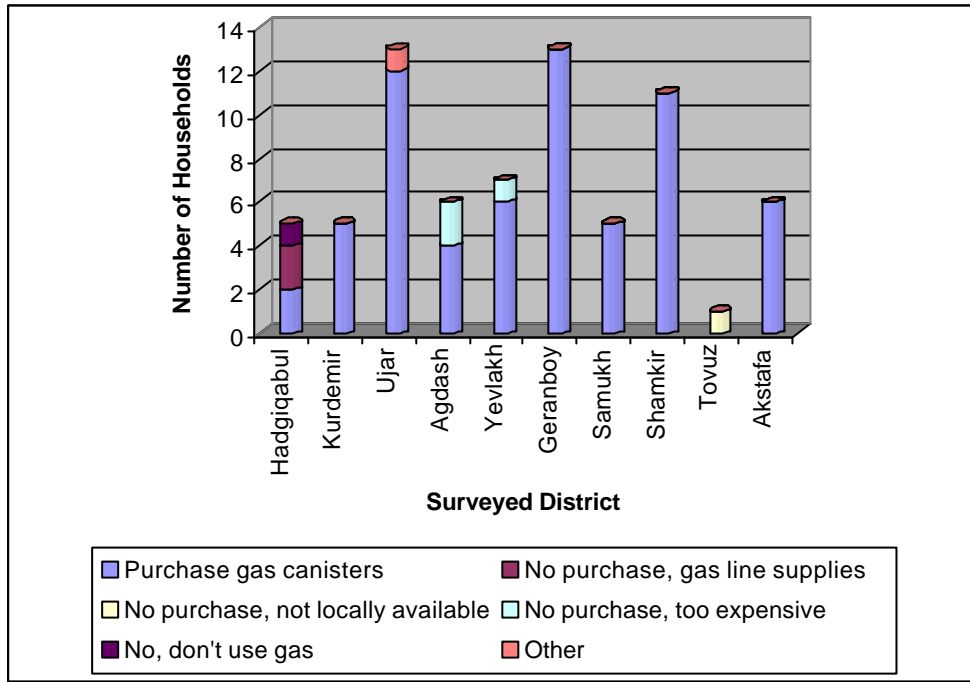
“There is no gas supply. Villagers cannot afford gas cylinders or firewood. They use brushwood that is picked from nearby trees.” (Geranboy District, Eyvazlilar Village)

“Part of the village is sufficiently supplied with gas, the other part is not, some households don’t have any gas at all and have to use firewood.” (Hadqiqabul District, Randjbar Village)

Approximately 4% of communities stated that they cannot afford the purchase of gas canisters and instead use wood, reeds or cow dung for fuel purposes. Given the minimal number of wooded areas along the corridor, extensive use of wood for heating purposes is not feasible.

Figure 9-11 shows the purchase of gas canisters by district. Two of the communities with permanent piped gas supply responded that they also purchase canisters for additional uses.

Figure 9-11 Purchase of gas canisters by district



9.4.2 Water

Water resources are scarce in Azerbaijan, and the problem of scarcity is compounded by extremely inefficient water transportation and use. The dilapidated and poorly managed irrigation system is responsible for agricultural water losses of about 50%. In industry the recycling of water is virtually non-existent.

Water quality in many parts of Azerbaijan is also very poor. More than 80% of the population lives in areas without modern water or sewage networks¹⁴. The Kura and Arax rivers, which provide most of Azerbaijan's fresh water are contaminated with industrial, agricultural and domestic wastes that are generated both inside and outside Azerbaijan. The Caspian, the world's largest inland water body, is also polluted but is vital for economic livelihoods in Azerbaijan because of both its hydrocarbon resources and its biological resources.

73% of communities in the survey area have no communal piped water supply and obtain their water mainly from canals. 16% have continuous piped water supply while 5% have an interrupted supply. The remaining sources are household wells or spring water. Figure 9-12 shows the status of communal water supply by district for the surveyed communities.

¹⁴ Azerbaijan Human Development report, UNDP 1999.

Figure 9-12 Communal water supply by district

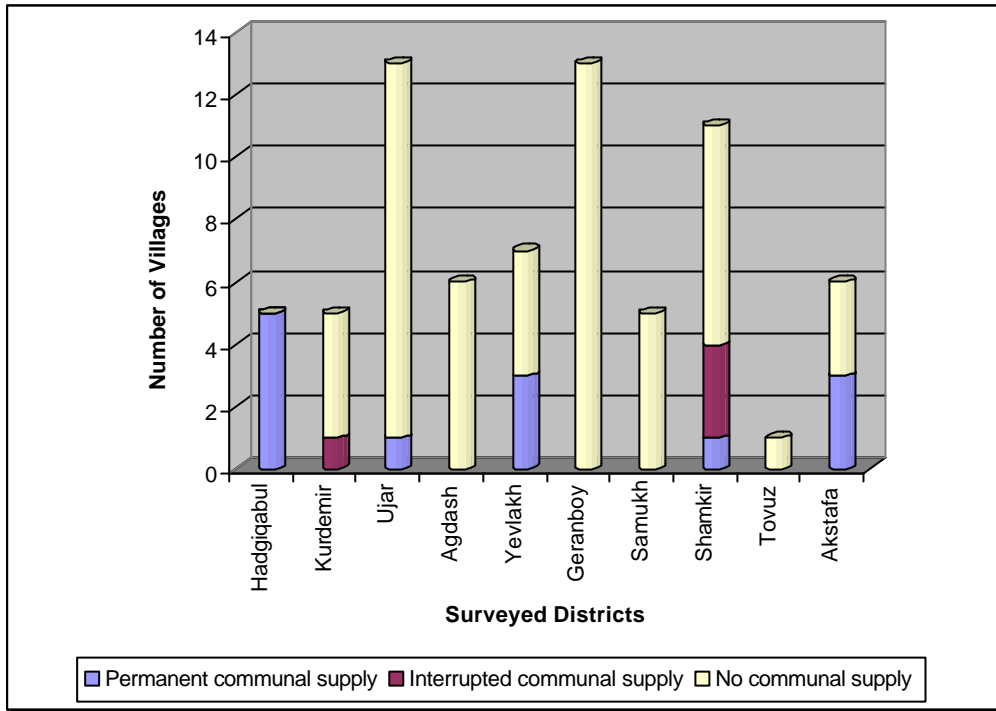
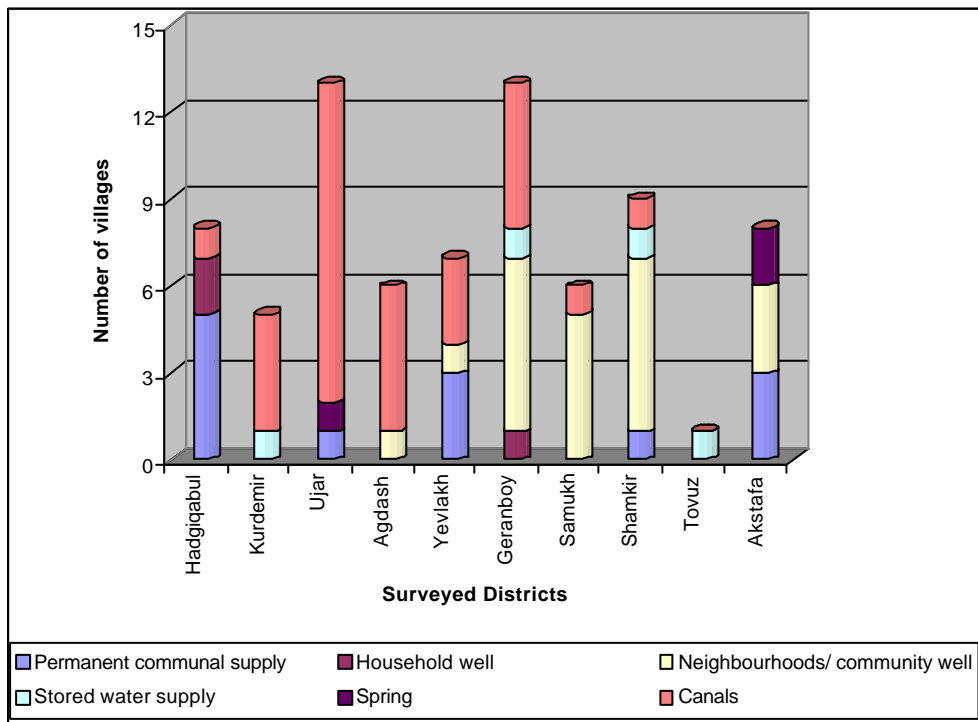


Figure 9-13 Water supply sources by district



“People buy potable water. For other purposes they use water from the canal, but there is not enough of it for irrigation. Water use from the canal raises disputes among neighbours.” (Agdash District, Amirarh Village)

“The major problem of the settlement is the shortage of drinking water. When there is electricity to power the water well pump, people have to stand in queues for hours.” (Yevlakh District, Aran Settlement)

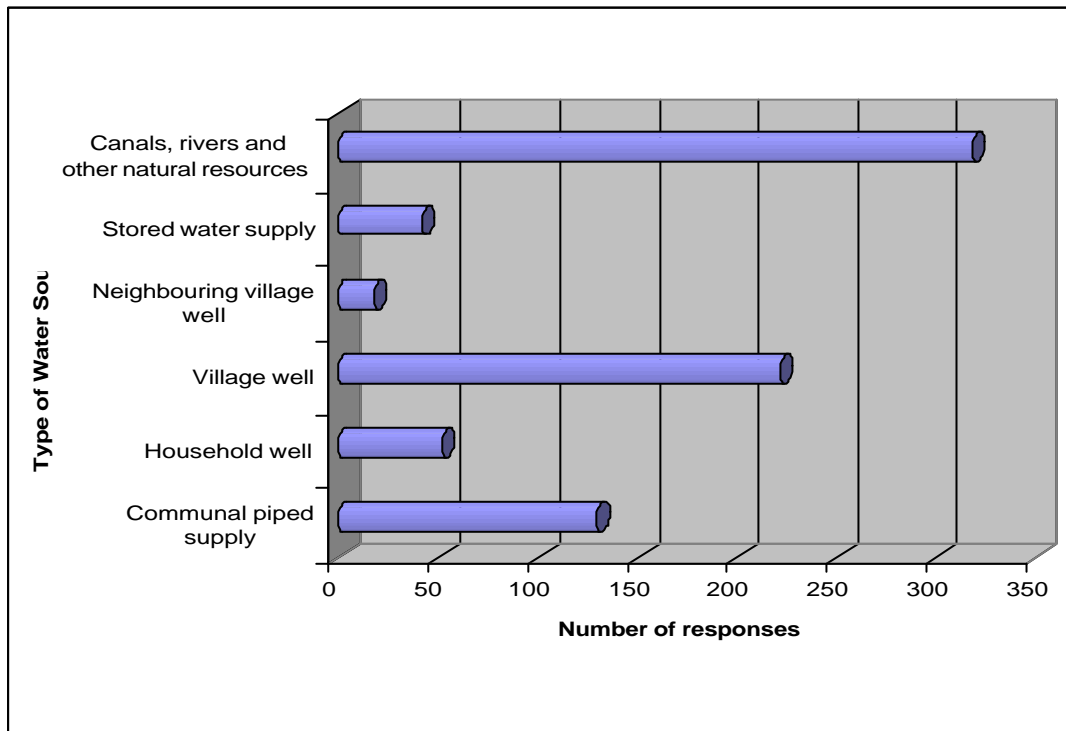
“There was a fire in the village two or three years ago and because villagers didn’t have enough water to extinguish it several houses burned down.” (Geranboy District, Beshirly Village)

“There is almost no economic development potential in the village, even though the farmland is fertile they can’t use it due to the lack of irrigation water.” (Shamkir region, Dallyar Djeir Village)

9.4.2.1 Agricultural use of water

Because of its arid climate, Azerbaijan has an extensive irrigation network. Over 80% of Azerbaijan's arable lands (which total over 1,000,000ha) are irrigated by more than 40,000km of canals and pipelines. Decreases in agricultural water consumption since independence are not a result of improved resource management, but rather a reflection of the overall decline in agricultural production. Irrigation channels have fallen into disrepair in some communities. This limits the agricultural productivity of some of the land where high levels of soil salinity mean that extensive irrigation is required to make the land productive. As shown in Figure 9-14, the main sources of irrigation waters in the survey area are canals and rivers, followed by use of community artesian wells.

Figure 9-14 Sources of water for agricultural use in the surveyed area

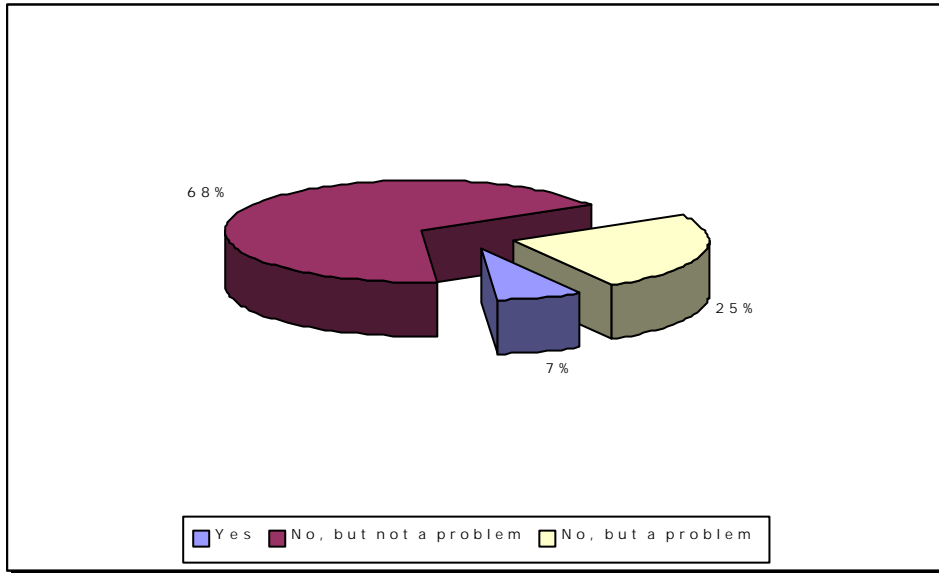


9.4.3 Sewerage and waste disposal

9.4.3.1 Sewage

Only eight communities (11%) and 7% of households/respondents have some kind of communal sewage collection system (see Figure 9-15). 68% of people stated that they do not have any sewerage system but that this did not present a real problem, while 25% responded that the lack of sewerage infrastructure was indeed an issue.

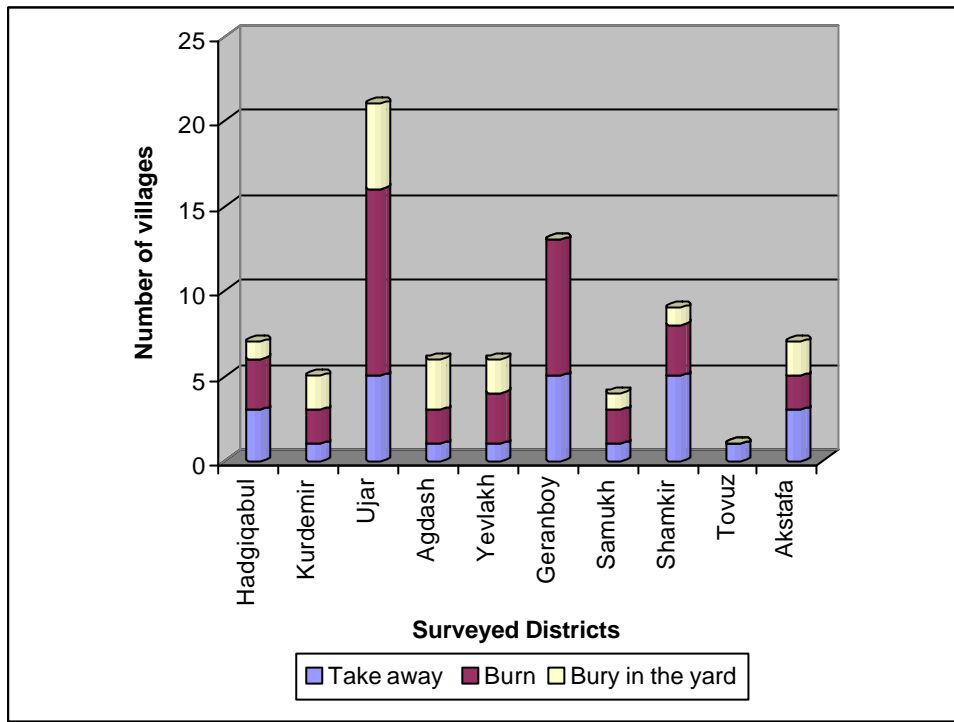
Figure 9-15 Access to sewerage system in the surveyed area



9.4.3.2 Waste disposal

Of the communities surveyed 26 stated that they take their waste and dump it outside of the community, 36 communities stated that they burn it and 17 bury it in the land around their homes. Waste disposal methods by district are shown in Figure 9-16.

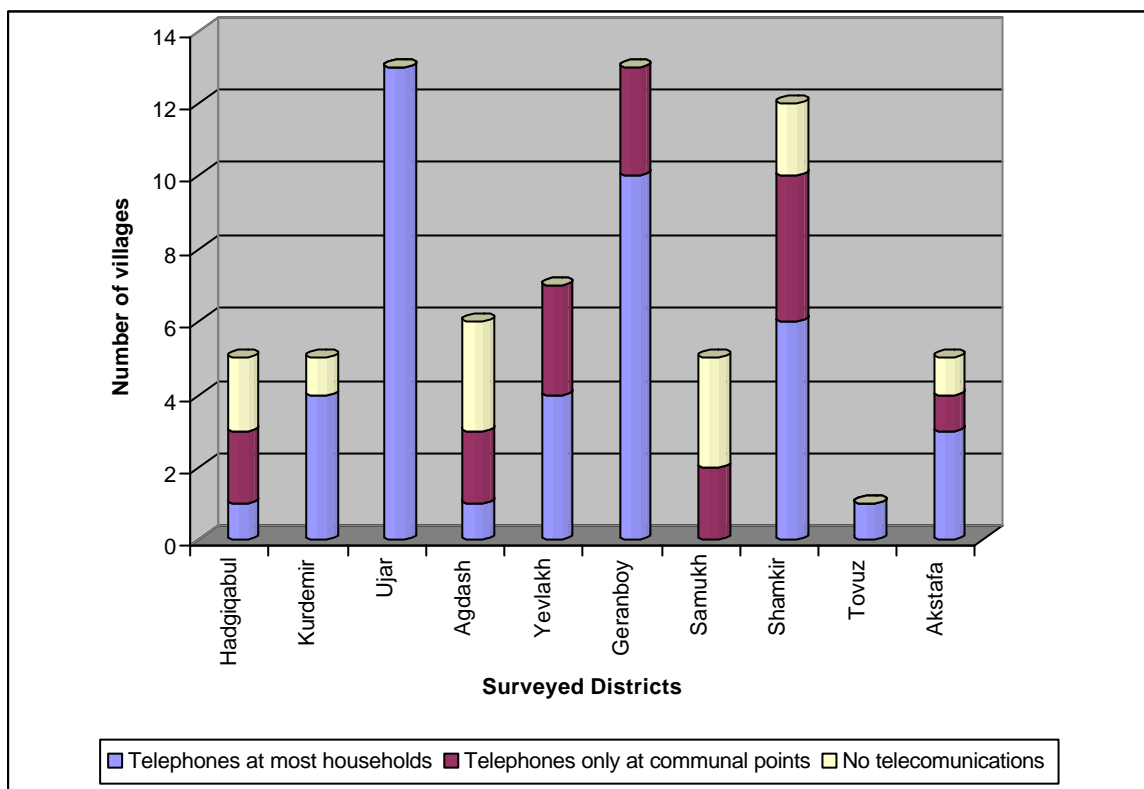
Figure 9-16 Waste disposal methods by district



9.4.4 Telecommunications

In 43 of the communities along the corridor, most households have a telephone. 17 of the communities have telephones only at communal points and 12 have no access to telecommunications at all. Household telephones are most common in the districts of Ujar, Geranboy and Shamkir. In the Samukh district, telephones are only found at communal points. Figure 9-17 shows the availability of telecommunications by district.

Figure 9-17 Telecommunications by district



9.4.5 Roads

The main Baku to Tbilisi road is in reasonable condition for most of its route, although there are sections of this road that are in need of repair. This road is currently undergoing an upgrade under the Silk Road Project between Alyat and Hadqiqabul (See Section 13, Cumulative Impacts for a brief description of this project). Secondary and tertiary roads are generally in a very poor state of repair. District officials stated that poor roads are one of the main problems for communities in all districts along the pipeline route.

“The roads in the village are in a bad condition, in rainy seasons they get muddy and it’s hard to go places.” (Agdash District, Amirarh Village)

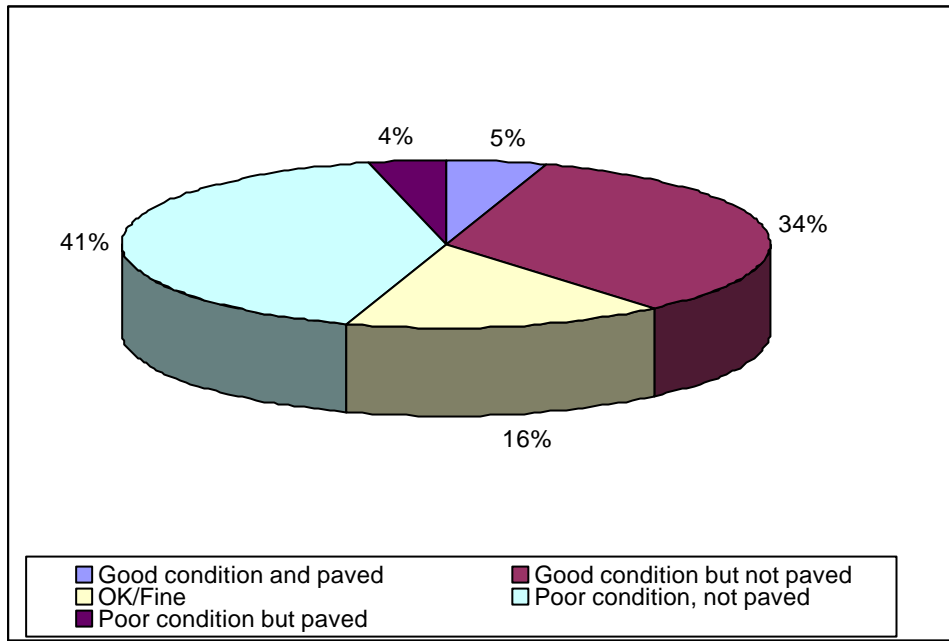
“Village roads are in a good condition as the municipal chairman funded their repair.” (Agdash District, Ashagy Garhun Village)

“Village roads are in a poor condition. In the summer they are dusty and in the winter they are muddy. Students have a hard time getting to school”. (Yevlakh District, Aran Settlement)

“Roads are not asphalted, in the winter people have trouble to travel. It is especially hard for school children since they have to walk about 3 km to their school”. (Samukh District Ashagy Agasybeyli Village)

As shown in Figure 9-18, 41% of all respondents stated that roads in their communities are in poor condition and not paved, and only 5% said that they are in good condition and paved.

Figure 9-18 Condition of roads in the surveyed area



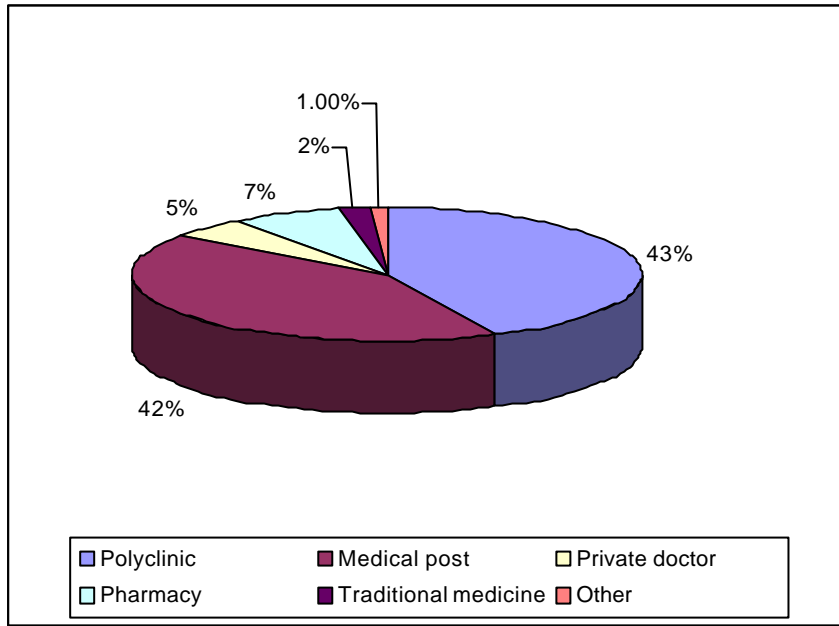
9.4.6 Health and education

9.4.6.1 Health

94% of community leaders highlighted problems with health services. There are 11 polyclinics¹⁵ along the corridor, three of which are in the Kurdemir district. 53 communities (73%) have access to some kind of medical posts. However, many of these have either no or very basic facilities and medicines. All of these facilities require some form of payment. Figure 9-19 shows the percentage of respondents with access to some form of health facility. Access to medical services is hindered by poor roads, resulting in neither patients nor doctors readily being able to travel to other communities to seek/provide services. Therefore, village inhabitants typically use local health services for emergencies and go to district centres in case of serious diseases or conditions.

¹⁵ The term polyclinic refers to a small hospital or clinic with a small number of staff and the capacity to undertake operations, but not large enough to have an ambulance service.

Figure 9-19 Availability of health care services in the surveyed area



“There is a secondary school in the village but it is in a bad condition. The classes are held in two shifts there.” (Akstafa District, Ashagy Kesamanly Village)

“There is a secondary school in the village. It has problems with power and there is no heating. Students’ parents have to pay for school repairs.” (Samukh District, Hodjaly Village)

“The village school has been renovated with the money from parents and donations from villagers living in Russia.” (Hadqiqabul District, Qarasu Village)

“Healthcare services are of poor quality. For a better medical treatment people have to go to the regional centre.” (Ujar District, Taza Shilyan)

There are currently no epidemiological data available for specific communities in Azerbaijan. Information on community level facilities has been obtained from consultation with leaders of communities along the corridor. 41 communities (57%) stated that villagers’ health had worsened in recent years, 13 (18%) said that it has improved and the remaining eighteen (25%) believe that villagers’ health had remained the same.

9.4.6.2 Education

Azerbaijan inherited from the Soviet Union a strong and comprehensive system of education. The literacy rate for Azerbaijan in 2000 was 97.3% with an average of ten years of schooling per person. As is the case in many countries of the FSU, however, Azerbaijan’s educational progress is now jeopardized by funding problems and structural weaknesses within the education system (according to the Azerbaijan Human Development Report, 1999).

All but six of the communities surveyed have at least one school. Seven communities have incomplete secondary schools (only 4 of the 9 grades) and many children have to travel long

distances to complete their secondary education. Almost all of the schools have no heating system and are in a poor state of repair, as well as lacking facilities and books.

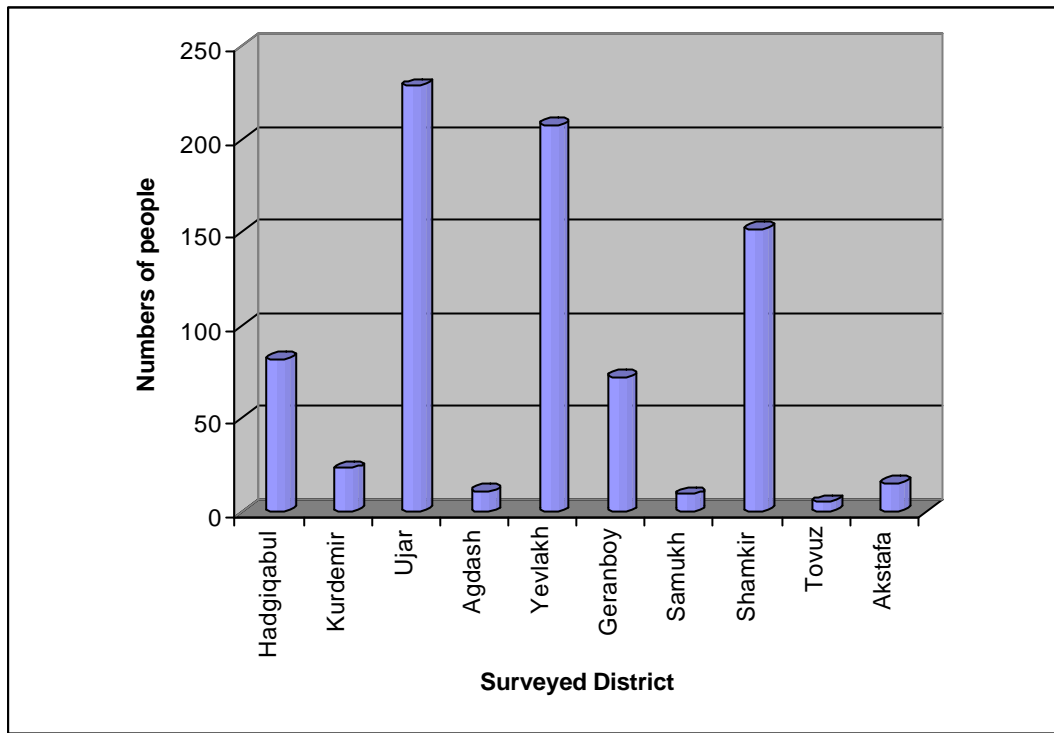
No school exists in the following communities:

- Chiyny - KP159
- Anver Memmedhanly - KP163
- Amirarh - KP205
- Agdjaqovak - KP217
- Eyvazlilar - KP251
- Ashagy Agasybeyli - KP293

The Constitution of Azerbaijan guarantees 11 years of free education to all citizens starting from the age of six. In general, education enrolment rates at both primary and secondary levels exceed 90% and there is no significant gender difference. The enrolment figures may disguise actual attendance levels, though. According to a World Bank household survey data, about 10% of enrolled children are absent from school for extended periods (one month or more during an academic year). There are significant district differences in the extent of extended absence. For example, among the very poor 6 to 16 year olds extended absence rates can be as high as 43%.

Figure 9-20 shows the total number of people who have had a higher education (degree or similar) by district, within the pipeline corridor. The highest level is in Ujar, though even here this only represents 0.7% of the district population within the corridor

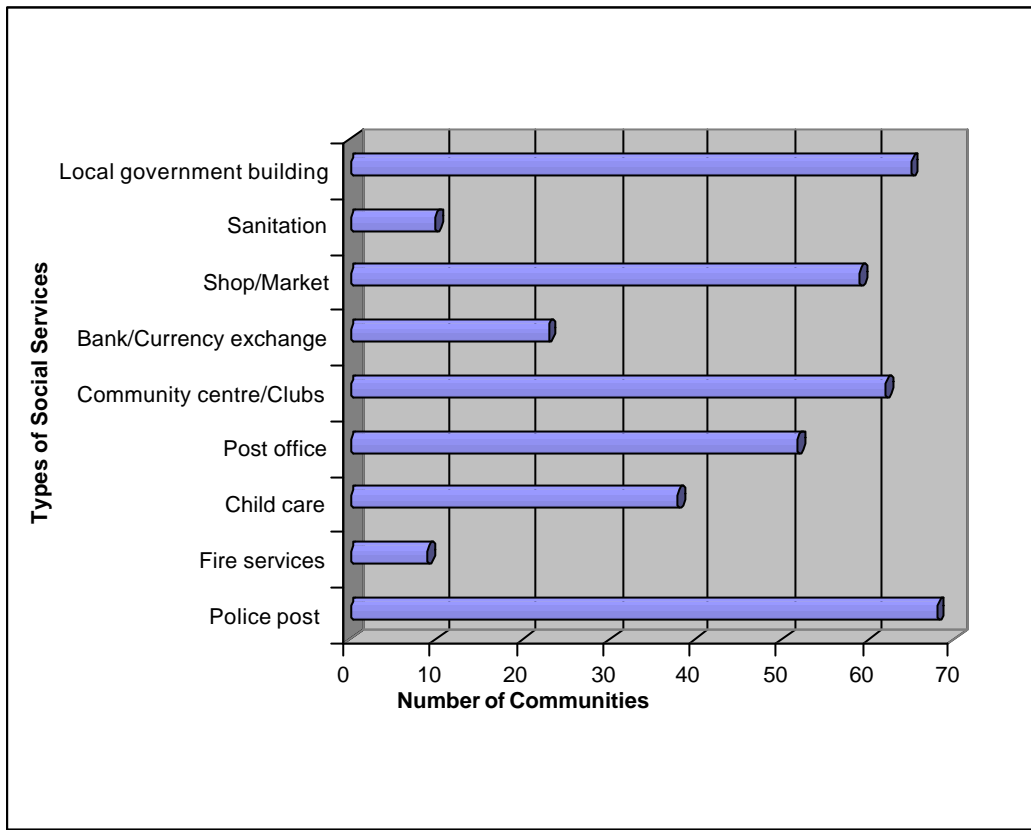
Figure 9-20 Numbers of people with higher education, by district



9.4.7 Other social services

Figure 921 shows the breakdown of different types of social services available along the route. Of note is the high provision of local government and police posts in nearly all communities. In contrast, very few communities have any fire or sanitation services.

Figure 9-21 Types of social services in the surveyed area



9.5 CULTURAL ASPECTS

9.5.1 Current information sources

Interviews reveal that all communities generally receive information via television, ensuring that televisions are turned on when electricity is available. 61% of householders reported obtaining information via television

Householders reported using additional information sources:

- 18% via radio
- 10% via newspapers
- 9% via conversations with other people

“People get most of their information from the television, but due to intermittent power supply they cannot watch it much. They also get news and information from local government executives and municipality officials.” (Samukh District, Ashagy Agasybeyli Village)

“We wish our local authority representatives would keep us informed.” (Kurdemir District, Chokhranly village)

“We are unaware of a possible pipeline construction because we don’t have power long enough to watch TV to get info.” (Geranboy District, Eyvazlilar Village)

“It is a good idea to distribute the project information leaflets, since we cannot receive much info from television due to power cuts.” (Yevlakh District, Narimanabad Village)

“ TV is the best source of information, but we cannot watch it often because of interrupted power supply.” (Samukh District, Seyidlyar Village)

9.5.2 Points of conflict and community problems

In Table 910 the primary and secondary community problems perceived by each district along the corridor are summarized. The question asked was, “What in your opinion are your settlement’s three most important problems?”.

Table 9-10 Primary and secondary problems by district

District	Approx KP	Main problems	Secondary problems
Hadqiqabul	41-95	Inadequate health care Inadequate irrigation	Poor roads Inadequate schools Poor drinking water supply Lack of employment opportunities
Kurdemir	96-140	Poor roads Poor drinking water supply Lack of employment opportunities	Inadequate health care Political problems Lack of money Electricity/gas supply
Ujar	141-195	Lack of employment opportunities Poor roads Inadequate schools Poor drinking water supply	Inadequate telecommunication Inadequate irrigation Inadequate health care Electricity/gas supply
Agdash	196-215	Lack of employment opportunities Poor roads Poor drinking water supply	Inadequate irrigation Electricity/gas supply
Yevlakh	216-250	Electricity/gas supply Poor roads Lack of employment opportunities	Poor drinking water supply Lack of money Inadequate irrigation
Geranboy	251-292	Electricity/gas supply Poor drinking water supply Lack of employment opportunities Inadequate irrigation	Poor roads Inadequate telecommunications

District	Approx KP	Main problems	Secondary problems
Samukh	293-320	Electricity/gas supply Poor roads Poor drinking water supply Inadequate irrigation Lack of employment opportunities	Inadequate schools Inadequate telecommunications Ethnic conflicts
Shamkir	321-360	Electricity/gas supply Inadequate irrigation Poor drinking water supply Lack of employment opportunities	Inadequate telecommunications Inadequate schools Poor roads
Tovuz	361-385	Poor roads Poor drinking water supply	
Akstafa	386-442	Electricity/gas supply Poor roads Lack of employment opportunities Inadequate health care Inadequate telecommunications Inadequate irrigation	Poor drinking water supply Lack of money

9.5.3 Community decision-making structures

71 communities stated that they prefer to solve their problems through community meetings. Most of the communities also ask advice of elderly people (often known as the Aksakal) and will also arrange meetings with municipality representatives and district authorities on some matters.

Problems are voiced to both the local representative of the executive power and to the locally-elected municipal representatives, who generally endeavour to lobby higher levels of government on community concerns. There is very little evidence of a wider active civil society along the route to represent local communities, except for several NGOs based in Ganja.

Most communities are waiting for the government to come and improve the levels of infrastructure, but have not actively mobilized themselves to solve their problems. On the other hand, IDP communities, which have been extensively involved with national and international NGOs, firstly as service providers but subsequently in capacity-building projects, have developed a stronger ability to resolve their own problems, to ensure access to infrastructure, land and resources ¹⁶.

During consultation in the villages, men were frequently found congregating in larger groups outside the home (such as the local teahouse) where community issues were discussed. By contrast, women generally remained indoors with little access to these informal meetings.

¹⁶ Information based on discussions with Oxfam International, December 2001

9.6 PROJECT-SPECIFIC ISSUES: ATTITUDES AND PERCEPTIONS

In addition to the overall baseline survey data, this Section draws on an analysis of information on specific attitudes and perceptions relating to construction camps, pipe yards and AGIs. It also analyses information taken from interviews aimed at characterizing any changes in perceptions to an oil pipeline from a gas pipeline, or to two pipelines instead of one. A total of 120 interviews were conducted in respect to camps and yards, with an additional 35 conducted with respect to AGIs. 72 additional interviews were also conducted addressing attitudes to the oil and/or gas pipeline. The latter interviews were conducted in each district across the corridor, in the communities shown in Table 9-11.

Table 9-11 Communities interviewed on oil vs gas project issues

District	Community	KP
Hadgiqabul	Qarasu	79
Kurdemir	Karrar	110
Ujar	Taza Shilyan	150
Agdash	Amirarh	205
Yevlakh	Ashagy Garhun	220
Geranboy	Sarov	285
Samukh	Hodjaly	302
Shamkir	Mahmudlu	330
Tovuz	Khatinly	382
Akstafa	Boyuk Kesik	440

9.6.1 Previous pipeline experience

Nearly 80% of the communities surveyed in the corridor have previous experience of the construction process for either the Azerigaz pipeline or WREP. There have been previous gas explosion incidents near two of the communities along the route: namely Randjbar village (in 1980, Hadgiqabul district) and Jinli Boluslu village (in 1973, Geranboy district). However, both of these incidents occurred well before the construction of the WREP in 1997.

60 of the communities surveyed (80%) are also located within 2km of an existing pipeline (either the Azerigaz pipeline or the WREP). Most of the population along the corridor is therefore aware of safety issues and measures to take in case of emergency.

“There are quite a lot of people with pipeline construction experience in the village. There are engineers, drivers and unskilled workers”. (Shamkir Region, Dashbulag Village)

“There are many pipeline construction specialists in the village that are more than happy to start working.”(Kurdemir District, Karrar Village)

“WREP construction did not bring any benefits to the village. We suppose that this time it will be the same.” (Shankir Region , Talish village)

9.6.2 Overall attitudes and perceptions to BTC/SCP project

Approximately half of those interviewed had already heard about the proposed new pipeline construction. However, most did not have much detailed information and did not know whether this was an oil or gas pipeline or that two pipelines were planned. People expressed an interest in knowing more, specifically:

- Details of construction including the schedule
- What to expect in terms of numbers of people involved, machinery, etc
- Details of the possible benefits of the pipeline, including compensation options
- The exact pipeline route in their area
- The potential for employment and the nature and number of jobs
- Potential damage to grazing land and what mitigation measures would be offered
- Long-term land use issues
- Details about construction camps and foreign workers
- Health and safety on the pipeline
- Potential for improving local infrastructure

In general, the overall attitude to the pipelines was positive but cautious. An interesting feature was the slightly more cautious attitude toward the gas pipeline than the oil pipeline. For example, 80% of all respondents stated that they perceived the project as a positive development and attributed the same categories of perceived benefits to both pipelines. However, 94% were positive about the development of the BTC oil pipeline and only 68% positive about the development of the SCP.

From the initial consultations with communities along the proposed pipeline route, the main perceived benefits of both proposed pipelines related to employment opportunities. The dominant concerns about the pipelines related mainly to damage or impediments to crop irrigation and grazing areas.

Key impacts anticipated by the communities were access to energy, employment, land, construction workers and social investment. These are discussed in more detail in the following sections. In addition to these the following attitudes can be noted:

- 94% of all respondents stated they were essentially positive about the construction of the oil pipeline
- Villagers along the route are wary of indirect benefits such as improved roads, after negative experiences with previous pipeline construction
- Respondents (mainly those employed in the state sector: health, education and social work) thought the pipeline would be beneficial to the state budget and improve the country's economic situation. Most respondents that are not working in the state sector were doubtful about the benefit to the state budget, noting that the average rural Azeri farmer has seen little if any direct benefit from oil and gas projects and foreign investment in the past
- Some of the wealthier landowners along the route expressed an interest in working and renting equipment during the construction process of the pipeline
- Eight respondents mentioned opportunities for social interaction with the construction team as a pipeline benefit
- Respondents mentioned improved social infrastructure

- Some respondents mentioned that they would like to use the construction crew's heavy machinery for their own needs.
- 26 respondents gave no response when asked if they saw benefits to the construction or explicitly stated that they saw none

The perceived benefits of the project are summarized in Figure 9-22.

“We support the construction of a gas pipeline, and expect that overall it'll be beneficial to the people in the country, new jobs will be created, pensions will grow, and living standards improve.” (Samukh district, Aly Bayramly Village).

“I support the construction of a gas pipeline in our area, I think it will contribute to socio-economic welfare of a future generation.” (Yevlakh District, Aran Settlement)

“We will be disturbed because of the noise all day long, they are going to be making money and we just have to stand it all.” (Akstafa District, Ashagy Kesamanly Village)

“Irrespective of any compensation I get it will still bother me if pipeline goes through my territory.” (Agdash District, Ashagy Garhun Village)

“ Because the pipeline construction is a large-scale project there will be environmental damage done, but I don't think it will be significant.” (Shamkir Region, Dallyar Djeir village)

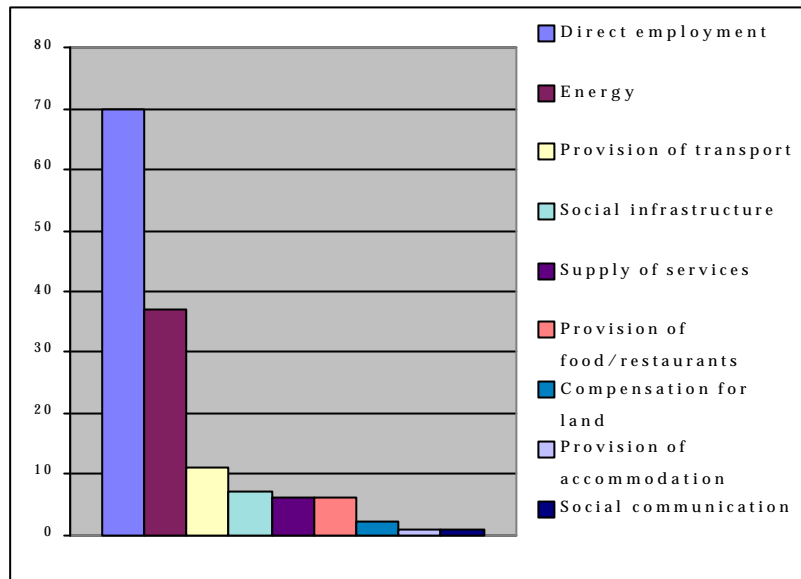
“I support the construction of a gas pipeline because it will a big contribution to an economic development of the country.” (Samukh District, Hodjaly Village)

“The only problem is safety. If all safety measures are in place and complied with, I don't think there will be a problem.” (Samukh District, Hodjaly Village)

“They should keep us in mind and build pipeline away from our territory. The dust here is very bad and looks like cement.” (Agdash District, Khatinly Village)

“I am opposed to the pipeline construction if we don't get gas supply.” (Geranboy District, Sarov Village)

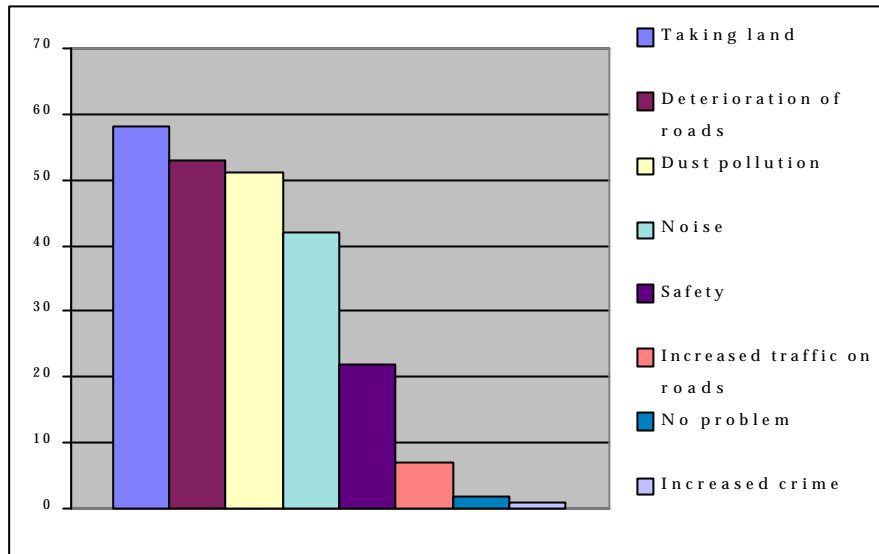
Figure 9-22 Overall perceived benefits of the project (% of respondents)



The respondents anticipated that the lengthier construction period for two pipelines (both BTC and SCP) would benefit them with longer lasting employment opportunities (either directly or through the supply of services).

The most frequently reported concern associated with the construction of the pipelines was the longer-term temporary or permanent land take. The longer construction period was also seen as contributing to the deterioration of main and internal village roads, increased dust and noise pollution. Figure 9-23 depicts respondents' overall concerns in respect of the pipelines.

Figure 9-23 Overall perceived problems of the project (% of respondents)

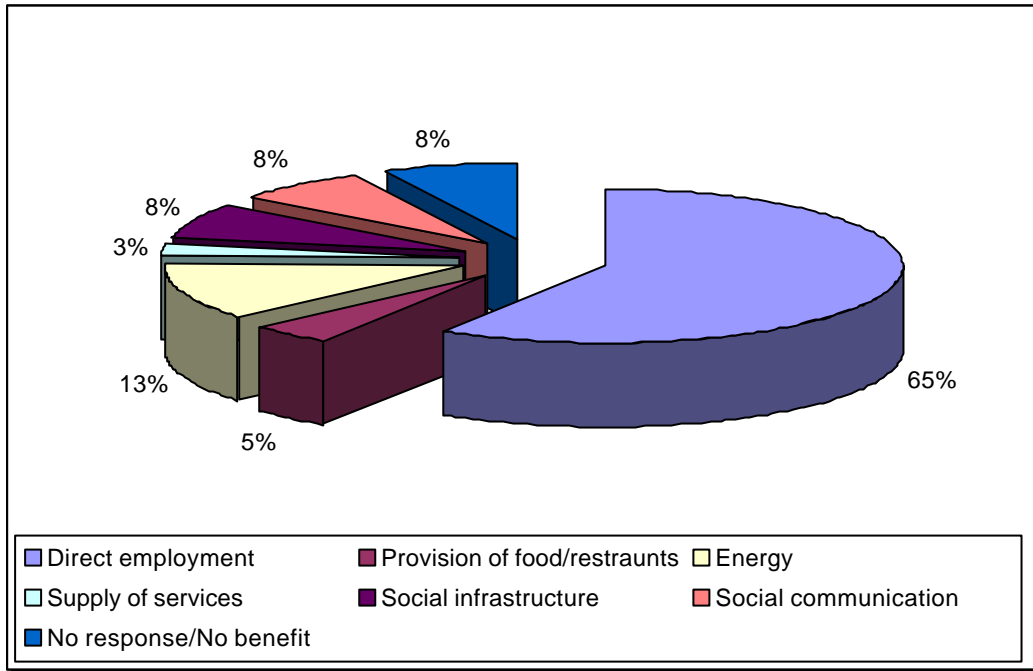


9.6.3 Specific attitudes to AGIs

There will be three major AGIs outside the Sangachal Terminal during the operation of the pipeline; an intermediate pigging station at KP124 near Chokhranly, a pigging station which will later become a pumping station at KP243 near to Aran and Yaldilly, and an intermediate pigging station at KP342 near to Dallyar Djeir and Dallyar Dashbulak.

Interviews were undertaken with communities potentially impacted by the development of an AGI. Of this sample set, 87% said they were essentially positive about the developments and 10% said they felt negatively, while 3% gave no response. The most important benefit that was perceived by the development was direct employment (65%) whilst the second most important was access to energy (13%).

Figure 9-24 Perceived benefits of living in proximity to an AGI

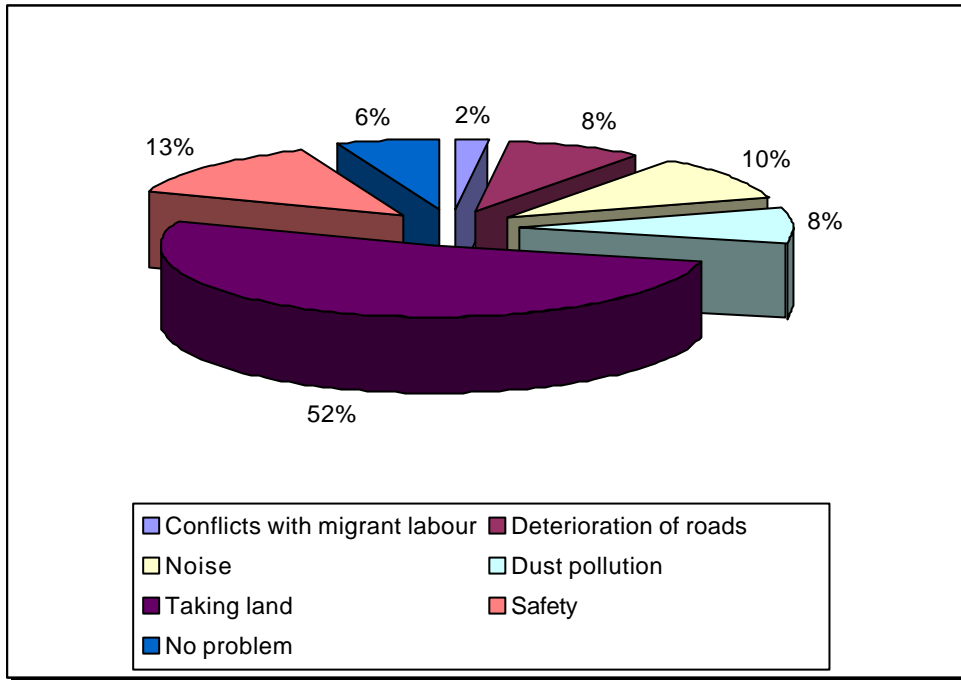


The greatest concerns expressed by these communities were that the project would take their land, or land that they use (52%), followed by concerns over safety (13%) and noise (10%). Problems perceived to be associated with living in proximity to an AGI are shown in Figure 9-25.

“We are concerned about the safety of a pipeline. Also our lands could be taken.” (Shamkir District, Dallyar Djeir Village)

“I am ready to bear all inconveniences if only somebody shows that they care about us.” (Kurdemir District, Chokhranly Village)

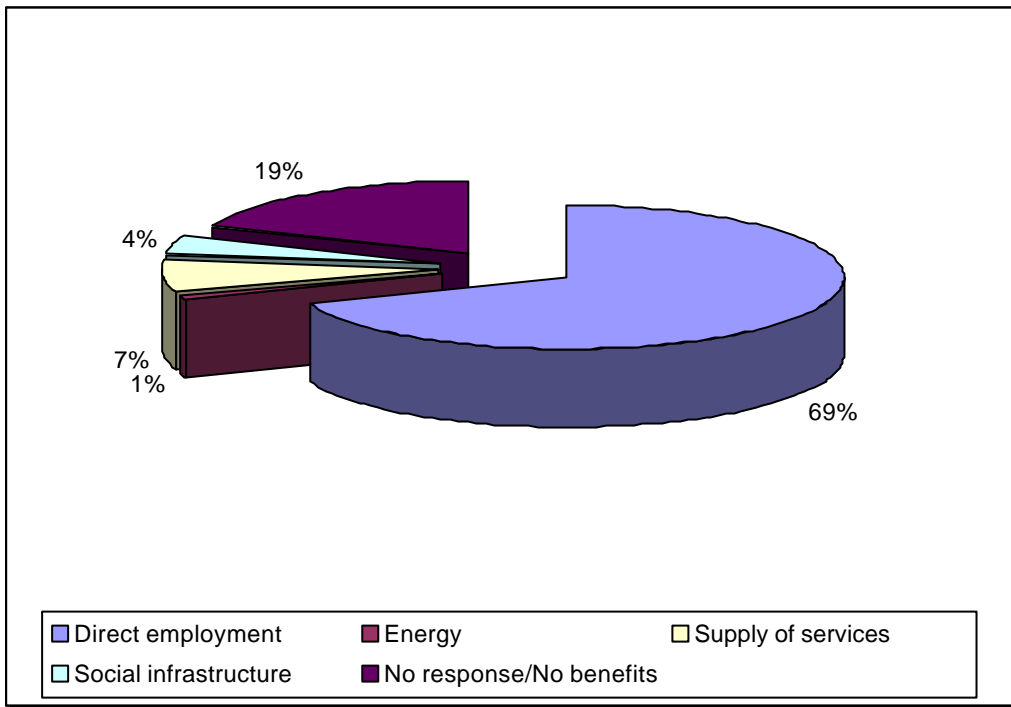
Figure 9-25 Perceived problems/concerns of living in proximity to an AGI



9.6.4 Attitude to pipe yards and construction camps

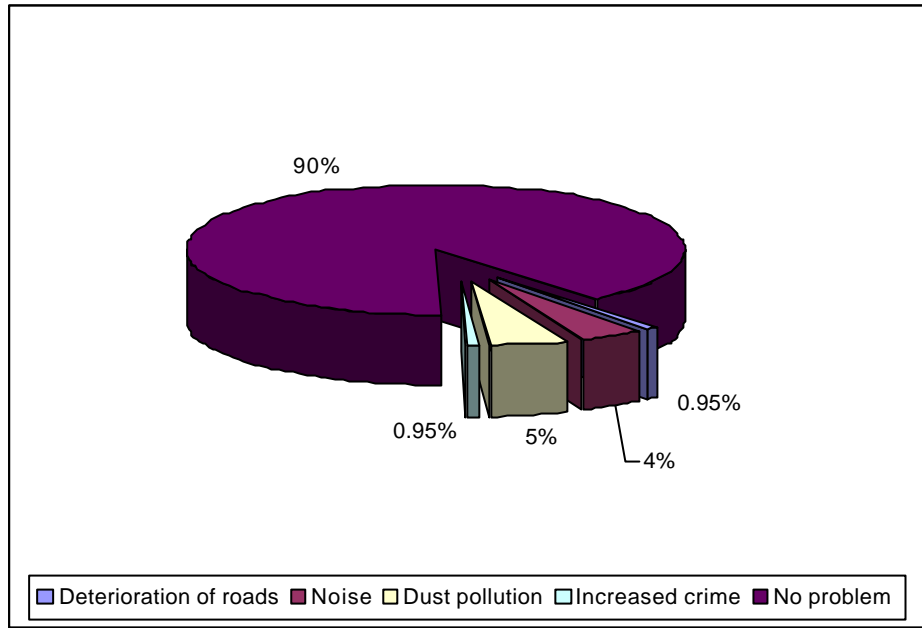
Interviews were undertaken with all communities potentially impacted by the development of a construction camp or a yard for the storage of equipment and materials. A total of 109 respondents were interviewed and all of them stated that they were positive about the development (see Figure 9-26). Again, the most important perceived benefit of the development was direct employment (70%), followed by employment/provision of services (7%).

Figure 9-26 Perceived benefits of living near a construction camp or pipe yard



While all respondents stated that they were positive about their proximity to a site proposed for a yard or a camp (indeed 90% did not foresee any problems), 10% of respondents (11 people) highlighted concerns as shown in Figure 9-27.

Figure 9-27 Perceived problems of living near a construction camp or pipe yard



The following key issues were identified in respect of community perceptions about the project, as summarized below:

- Energy
- Employment
- Impacts to land and infrastructure

These issues are addressed in Sections 11, Socio-Economic Baseline, 12, Residual Impacts, 13, Cumulative Impacts, and 15, Overall Project Assessment, which discuss the impacts of the pipeline and proposed mitigation measures.

“There was a pipe yard in our village 2 years ago. We’ll interact with workers, and learn some news.” (Akstafa District, Boyuk Kesik Village)

“Noise would not disturb us. We are used to noises coming from nearby plants.” (Ganja Town)

“Location of a pipe yard nearby is not desirable. Though I could temporarily lease my house to workers.” (Yevlakh District, Yevlakh Town)

“If workers behave properly there shouldn’t be any problems, though I am a little afraid, my husband and brothers are away in Russia, and I am all alone here.” (Hadgiqabul District, Mugan Village)

“We don’t want the project employees to be near our houses, as our wives are home the whole day.” (Garadag District, Sangachal Village)

“If workers behave decently they won’t have any problems with villagers.” (Shamkir District, Zeyem village)

“Heavy machinery could damage our road, it is suggested that BP will restore them after construction is complete.” (Agdash District, Leki Village)

9.6.5 Energy

Access to electricity and gas supply was one of the most important issues for communities along the pipeline corridor, eg, only 11% of people stated that they have regular access to electricity and 12% of people have a piped supply of gas.

Most people within the proposed route corridor want improvements to their gas and electricity supply and hope that some increase to their energy supply will result from the pipeline, although most recognize that this would not come directly from the pipe itself. There is concern among some villagers that in the end they won't get an increased energy supply and all the country's oil and gas will go to Turkey.

“People hope that they will be provided with gas from the pipeline, in that case they will not have to cut down trees for firewood as they do now.” (Shamkir Region, Dellyar-Djeir Village)

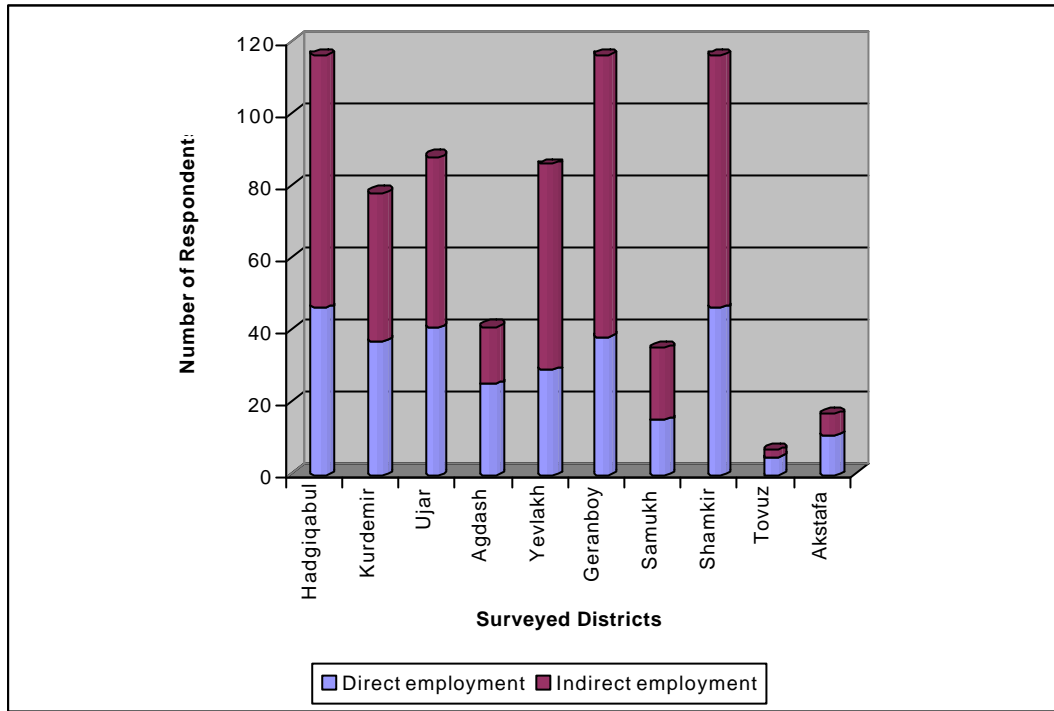
“The biggest benefit could be gas supply, and also some help to solve the water problem.” (Geranboy District Erevanly Village)

9.6.6 Employment

High levels of unemployment in the districts crossed by the pipeline mean that most respondents welcome the opportunity for any employment that the pipeline offers. There is a strong desire to participate in the construction process and also to supply different types of services to the construction workers.

Figure 9-28 shows that the majority of people believe that the greatest opportunities for income generation lie in supplying services to the construction workers, rather than in direct employment. The reason for this is that many people lack the necessary skills for pipeline construction. Also, there is recognition that the number of jobs available will be limited. Many communities along the proposed pipeline route are located near the main road and there are numerous canteens and restaurants eager to supply food to the construction crew(s). Provision of food to the pipeline construction workers was cited by 230 (28%) of all respondents as a perceived benefit.

Figure 9-28 Interest in employment by district



There was strong promotion of local skill levels by community leaders during the consultation process, particularly for skills such as welding and bulldozer/ excavator driving.

Considerable concern has been voiced throughout consultation activities that the hiring process would involve nepotism, making it difficult or expensive for some people to get hired.

“Me and many others would love to be employed during construction. There are many people unemployed in the village that would take any employment opportunities.” (Samukh District, Garaarh Village).

“Young people don’t have anything to do, since there is no work, they could work at the pipeline construction.” (Shamkir District, Mahmudlu Village)

“It would be a great benefit if people from our village are employed during construction.” (Akstafa District, Zelimhan Village).

9.6.7 Impacts on land

144 people (18% of the baseline sample) indicated that appropriation of land from locals was one of the main problems with the proposed pipeline construction. The population’s attitude towards the proposed pipeline has been affected by negative experiences during construction of the WREP, in particular in relation to land compensation and damage to roads and irrigation networks¹⁷. Respondents mentioned that land compensation should first be directly

¹⁷ Nevertheless, it should be pointed out that during WREP construction, land reform had not yet been completed and in some regions not even started. Some villagers are still claiming compensation for land and production that was damaged during (PTO) construction. In

negotiated with landowners and paid directly to them rather than to a central fund. The population of Ashagy Garhun community (KP220) in the Yevlakh district expressed strong objections to the pipeline going through their cemetery. The pipeline has been re-routed to avoid the cemetery.

Some villagers are hoping for some financial compensation for impacts on property and private land during construction. Certain villagers, particularly in the west of the country, are concerned that the pipeline will disturb grazing of sheep and cattle.

People who don't use their land plots hope to get compensation for them from the pipeline. Those who do use their land are either opposed to use of their land or determined to secure a high level of compensation. These concerns are very significant, since agriculture is such an important source of income.

One of the respondents' main concerns is that they will be unable to use their land not only during the construction process but also once the pipeline is completed and operational. However, owners will be able to re-use the land with a number of restrictions, following reinstatement of the ROW.

Herders consulted along the route informally, who use municipal land during the winter months for grazing purposes (see Section 9.3.4, Seasonal grazing) expressed a positive attitude towards the pipeline and do not expect that the construction period will have major negative impacts for them. This group perceives that the biggest potential impacts will be loss or damage to livestock and restrictions on moving herds to their preferred grazing areas. Some shepherds who had previous experience of BP's operations also felt that BP's safety measures were too strict and that they would affect their grazing practices.

"The pipeline won't be harmful for the village, but it can damage our farmland." (Samukh District Ashagy Agasabeyli Village)

"We are concerned that we won't be allowed to use our land after construction. If that is the case we want to receive fair compensation." (Shamkir Region, Dashbulak Village)

"I want to know whether the pipeline will go straight through my house. If that is the case, what should I do? I don't want to move." (Shamkir Region, Dashbulagk Village).

"Vehicles can do damage to the land." (Geranboy District, Eyvazlilar Village)

9.6.8 Impact on infrastructure

9.6.8.1 Roads

Damage to roads during construction was noted as a concern of the surveyed communities. People are worried about possible road damage because the roads are in very poor condition. During the survey it was discovered that following the completion of the WREP, the

the village of Ranjbar (Hadgigabul region) farmers showed a copy of a letter regarding production losses and compensation claims, which had been sent to AIOC.

construction company had repaired roads damaged during the construction process. However, in certain communities, it was claimed that roads were not restored.

9.6.8.2 Irrigation channels

Respondents stated that they always dig irrigation and drainage channels in the same place, and that most of these channels are also cemented. Some of the respondents think that construction operations could damage their irrigation channels. Again, this was a key concern following construction of the WREP.

9.6.8.3 Waste and sanitation

Respondents do not anticipate that the proposed pipeline construction will cause any problems for the communities' sanitation.

9.6.8.4 Telecommunications

Based on experience of the WREP, some of the respondents think that there might be the opportunity to use the construction workers' mobile telephones and see this as a benefit.

9.6.9 Possible community investment benefits

Many community leaders and members of the communities themselves are hoping that the construction crew will be able to help them improve their basic living conditions. For example, people noted that they were hoping to have access to bulldozers and excavators, or expertise to repair water pumps and other basic community infrastructure. Others are hoping for improvements to social infrastructure especially roads, irrigation systems, schools and medical facilities that are beyond the pipeline project mitigation requirements. About a year after the major survey work had been completed, discussions were held with all communities to help identify their basic needs beyond project mitigation and the results of this exercise are being fed into the development of a separate social investment programme.

“Villagers hope that they’ll be allowed to use construction equipment to solve some village problems. Otherwise they won’t be able to do it themselves.” (Kurdemir District, Chokhranlı Village)

“People hope to get roads repaired if pipeline goes through their territory.” (Kurdemir District, Sigirly Village)

ENVIRONMENTAL IMPACTS AND MITIGATION

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10 ENVIRONMENTAL IMPACTS AND MITIGATION

10.1 INTRODUCTION

This Section sets out the environmental aspects and potential environmental impacts that could arise as a result of the construction, operation, decommissioning and abandonment of the SCP. It also discusses the proposed environmental mitigation measures that will be applied in order to reduce or remove the potential impacts.

The impact assessment is based on the assumptions that:

- The BTC pipeline has already been installed
- Interim reinstatement of BTC has been completed
- All necessary roads and worker camps are *in situ* from the BTC pipeline

The impact assessment will be revised if this is not the case.

The potential environmental impacts are linked to the general aspects associated with the project which are identified in Section 10.2. The impacts and proposed mitigation measures have been defined in line with the methodology described in Section 7, and are discussed in Section 10.3. The potential impacts have been evaluated with particular reference to the sensitivities of the key environmental components identified in Section 8.

The significance of the impacts that remain after implementation of the mitigation measures (ie the 'residual impacts') has also been assessed. Residual impacts are discussed briefly in Section 10.3 and in more detail in Section 12. Section 10.4 addresses the likelihood of a rupture occurring during operation of the pipeline and discusses the impacts that might arise in the event of a major leak. It also describes a range of measures that would be considered if a leak occurs.

Section 10 should be read with reference to Tables 10-2 and 10-3 and the Environmental Route Maps provided in Volume 2. A flow diagram illustrating how to read this Section in combination with the Tables and Environmental Route Maps is provided in Figure 10-1.

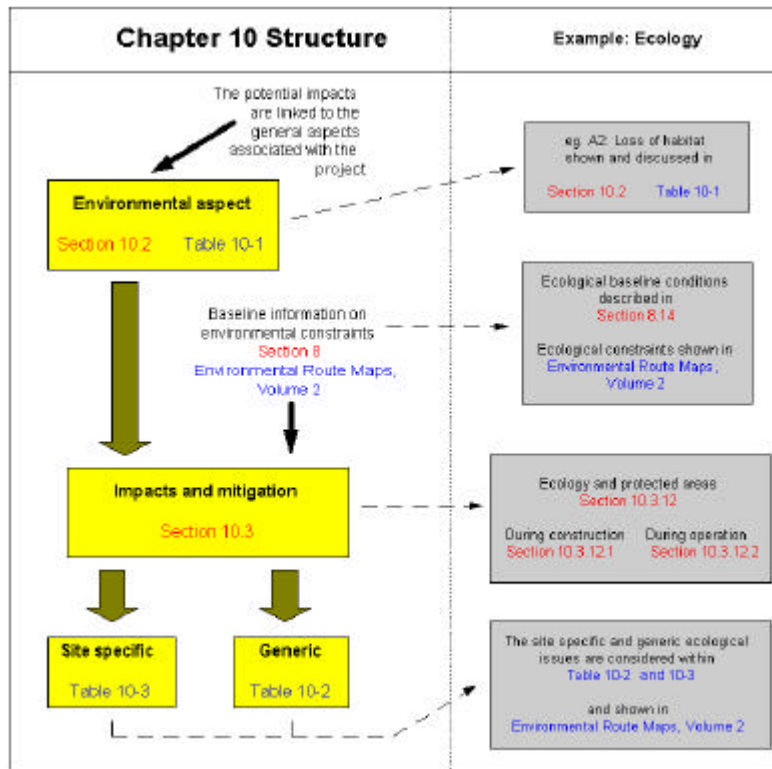
10.1.1 Aspect, impact, mitigation and residual impact tables (10-2 and 10-3)

The impacts, environmental mitigation measures and residual impacts associated with the generic aspects identified for the project in Section 10.2 are described and summarised in Table 10-2. The impacts, mitigation and residual impacts associated with route specific concerns (ie those relating to areas of particular environmental sensitivity, as identified through the baseline surveys outlined in Section 8) are described and summarised in Table 10-3. The assessment of the level of significance of the residual impacts has been undertaken in line with the methodology provided in Section 7 (None, Low, Medium or High) and is also provided in Tables 10-2 and 10-3.

10.1.2 Environmental route maps

Environmental Route Maps are provided as a separate volume to this ESIA (Volume 2). The maps illustrate the route specific constraints that are referred to in Table 10-3, together with additional baseline information from Section 8. The maps should also be referred to when reading this Section.

Figure 10-1 Flow diagram illustrating how to use this section



10.1.3 Monitoring and management plans

The mitigation measures detailed in this section will be implemented during the project with the aim of minimising the potential impacts on the environment. They will be incorporated into a number of management plans, listed below, which are referred to both in the text of this Section and in Tables 10-2 and 10-3.

- Community Safety Management Plan
- Community Liaison Management Plan
- Construction Camp Management Plan
- Infrastructure and Services Management Plan
- Procurement and Supply Management Plan
- Employment and Training Management Plan

- Procurement and Supply Management Plan
- Transport Management Plan
- Cultural Heritage Management Plan
- Reinstatement Summary Plan
- Pollution Prevention Management Plan
- Waste Management Plan
- Emergency Response Plan
- Oil Spill Response Plan
- Environmental Investment Plan

Information about the environmental scope of the plans is given in Section 14.

10.2 IDENTIFICATION OF ENVIRONMENTAL ASPECTS

The environmental aspects of the SCP project have been identified for all activities associated with construction and operation of the pipeline and associated facilities (Table 10-1).

Table 10-1 Identification of activities and environmental aspects

ACTIVITY	ASPECT NO. ¹	ENVIRONMENTAL ASPECT
General Activities during Construction and Operation		
Procurement	A1	Use of raw materials and natural resources
Land take for facilities, construction camps, pipe yards, access roads, AGIs and working width	A2	Loss of habitat
	A5	Introduction of competitive species or diseases
	A6	Visibility
Use and storage of materials (eg lubrication fluids, oils, paints, diesel etc)	A7	Pollution by accidental spillage of hazardous materials
	A8	Production and disposal of solid and liquid waste
	A9	Production of black and grey water
Maintenance, use & movement of vehicles, plant and equipment	A11	Vehicle movements
	A12	Soil compaction
	A13	Dust generation
	A14	Combustion gases
	A7	Pollution by accidental spillage of hazardous materials (particularly fuel & oil leaks from vehicles and plant)
	A16	Noise emissions
Construction Camps and Storage Yards		
Pipe and materials delivery	A11	Vehicle movements
	A3	Rail movements
Power generation	A14	Combustion gases
Water supply	A17	Ground Water Abstraction
Occupation of camps	A8	Production and disposal of solid and liquid wastes
	A16	Noise emissions
Construction of Pipeline and Facilities		

¹ Note: Some aspect numbers were removed during drafting; the numbers have not been reallocated to avoid the introduction of cross referencing errors

Table 10-1 Identification of activities and environmental aspects

ACTIVITY	ASPECT NO. ¹	ENVIRONMENTAL ASPECT
Construction of temporary roads and access routes		None as <i>in situ</i> from BTC project
Final survey and staking		(No additional aspects to those listed in General Activities)
Boundary (fences, tree lines, ditches) and vegetation removal	A2 A6 A44 A18	Loss of habitat Visibility Loss of boundaries Disruption of drainage/irrigation channels
Topsoil stripping	A13 A19 A20	Dust generation Soil erosion Disturbance of archaeology
Topsoil storage	A21 A22 A23 A24 A19	Loss of soil structure & fertility Loss of viability of seed bank Impeded movement of wild animals and domestic herds Increased flood risk Soil erosion
Grading	A13 A19 A20 A25 A26	Dust generation Soil erosion Disturbance of archaeology Modified topography Disposal of surplus subsoil
Trenching (excavation & storage of subsoil)	A13 A19 A28 A20 A29 A23 A30	Dust generation Soil erosion Disturbance of known/unknown contaminated land Disturbance of archaeology Disposal of trench water Impeded animal movements Public and animal safety
Dewatering	A17 A42	Groundwater abstraction Discharge of groundwater
Pipe stringing and bending	A23	Impeded movement of wild animals and domestic herds
Pipe welding and inspection	A14 A4	Combustion gases Metal vapour emissions
Field coating (including application of concrete coating in field)	A8	Disposal of solid & liquid wastes
Lowering and backfill	A13 A19 A27	Dust generation Soil erosion Altered drainage
Site clean-up and restoration <ul style="list-style-type: none"> • Replacement of subsoil to create pre-construction profile • Replacement of topsoil • Replacement of boundaries (fences, tree planting) • Removal of all construction equipment • Revegetation 	A13 A19 A27 A25 A5	Dust generation Soil erosion Altered drainage Modified topography Introduction of competitive species and diseases
Construction of Crossings		
Road crossings	A34	Partial road closure

Table 10-1 Identification of activities and environmental aspects

ACTIVITY	ASPECT NO. ¹	ENVIRONMENTAL ASPECT
Open-cut watercourse crossings <ul style="list-style-type: none"> • Benching of river bank • Excavation of river bed • Installation of flume pipes • Over-pumping 	A35 A19 A36 A37 A6 A2	Sediment release Soil erosion Modified river flow Impeded fish migration Visibility Loss of (aquatic) habitat
Non-open cut watercourse crossings <ul style="list-style-type: none"> • Deep excavations for launch/reception pits • Piling 	A29 A27 A30 A16	Disposal of trench/pit water Altered drainage Public & animal safety Noise from piling activities
Horizontal directional drilling	A41 A8	Potential for drilling fluid breakout/spillage Disposal of drill cuttings
Testing and Commissioning		
Hydrostatic testing <ul style="list-style-type: none"> • Abstraction of water • Discharge of water 	A17 A36 A19 A8/9	Groundwater abstraction Modified river flow Soil erosion Disposal of liquid wastes/water
Drying (vacuum and nitrogen) and venting	A16	Noise emissions
In situ testing of AGIs	A14 A16	Combustion gases Noise emissions
Operation		
Normal operation	A6 A10 A38 A8 A7 A16 A11 A13	Visibility Disturbance of land surface and vegetation Vented and fugitive emissions of gas Disposal of solid & liquid waste Pollution by accidental spillage of hazardous materials (particularly fuel & oil leaks from vehicles) Noise emissions Vehicle movements Dust generation
Decommissioning & Abandonment		
Eventual removal of pipeline and facilities	A13 A14 A8 A10 A11 A16	Dust generation Combustion gases Production & disposal of solid wastes Disturbance of surface vegetation Vehicle movements Noise emissions

10.3 IMPACT ASSESSMENT AND MITIGATION DEVELOPMENT

10.3.1 Introduction

This Section sets out the potential environmental impacts that could arise as a result of development of the SCP project. It also discusses the proposed environmental mitigation measures that will be applied during construction and operation of the SCP and associated facilities in order to reduce, or remove, the potential impacts. The significance of the residual impacts after implementation of the proposed mitigation measures has also been assessed and is discussed briefly in this Section. Where a residual impact is of Medium or High significance, it is discussed in more detail in Section 12, Residual Impacts.

10.3.2 Pipeline routing and design

Environmental protection and mitigation of potential impacts is an integral part of the SCP project development, from conceptual design through to construction and operation. A key mitigation already implemented has been routing of the pipeline to avoid areas of high environmental sensitivity, including those crossed by the existing WREP, as follows:

- Shortening of the route by approximately 12km through the sensitive Gobustan Desert habitat
- Routing to avoid the Korchay State Forbidden Area
- Routing to avoid the Shamkir State Forbidden Area

These deviations from the WREP have reduced the impact on sensitive habitats and have shortened the route from the outset, thereby reducing the overall environmental impact of the pipeline.

The engineering process has also been used to mitigate identified environmental impacts, through design and operation changes and the selection of equipment. This aspect of the mitigation process is described in detail in Section 4, Project Alternatives, and Section 5, Project Description.

10.3.3 Climate and air quality

This section assesses the potential impacts on air quality and climate as a result of construction and operation of the SCP. The evaluation focuses on the following pollutants:

- Carbon dioxide (CO₂)
- Methane (CH₄)
- Nitrogen oxides (NO_x) - (nitrogen dioxide (NO₂) and nitric oxide (NO))
- Sulphur dioxide (SO₂)
- Carbon monoxide (CO)
- Volatile organic compounds (VOCs)²

² The term VOC is loosely applied to a wide range of organic compounds but in this context it is used as defined in the UNECE VOC Protocol (1991) as “all organic compounds of an anthropogenic nature,

- Particulate matter (PM)³
- Nuisance dust⁴

These substances represent the atmospheric pollutants that will be released as a result of the SCP project that are most commonly regulated and monitored internationally, due to their potential to impact on local air quality and climate.

CO₂, CO, NO_x, SO₂, PM, VOC and CH₄ are generated in varying amounts as a result of burning fossil fuels and are often termed 'combustion gases'.

NO₂, CO, SO₂, and PM are most commonly associated with impacts on local air quality. Ambient air quality standards set pollutant concentrations that ensure healthy air quality. EU air quality standards and World Health Organisation (WHO) guidelines for these pollutants are internationally recognised and are presented below in Table 10-4. Pollutants can have acute (short-term) and/or chronic (long-term) effects on human health/ecosystems. The standards and guidelines are expressed over averaging periods that reflect whether a substance has an acute and/or a chronic effect.

Table 10-4 EU and WHO ambient air quality standards/guidelines

POLLUTANT	AVERAGING PERIOD	NO. OF EXCEEDENCES PERMITTED	LIMIT / GUIDELINE VALUE (µgm ⁻³)	RELEVANT STANDARDS/ GUIDELINES
NO ₂	1 year	N/A	40 40 30	WHO guideline EU (human health) EU (vegetation)
	1 hour	0	200	WHO guideline
	1 hour	18	200	EU (human health)
SO ₂	1 year	N/A	20 50	EU (ecosystems) WHO guideline
	24 hours	0	125	WHO guideline
	24 hours	3	125	EU (human health)
	1 hour	24	350	EU (human health)
CO	8 hour	0	10,000	EU standard
	8 hour	0	10,000	WHO guideline
	1 hour	0	30,000	WHO guideline
PM ₁₀ ⁽¹⁾	1 year	N/A	40 20	EU (Stage 1)(human health) EU (Stage 2)(human health)
	24 hours	35 7	50	EU (Stage 1)(human health)
			50	EU (Stage 2)(human health)

⁽¹⁾ Stage 1 standards should be met by 31 December 2005; stage 2 by 31 December 2010.

Carbon dioxide and methane are the two main compounds most commonly referred to as 'greenhouse gases'. It is believed that the accumulation of such gases in the atmosphere can contribute to global warming. Other pollutants such as the oxides of nitrogen and carbon

other than methane, that are capable of producing photochemical oxidants by reactions with nitrogen oxides in the presence of sunlight".

³ Particulate matter is used in this context to describe inhalable particles.

⁴ Nuisance dust is a term commonly used to describe deposition of inert dust (eg on vegetation, dwellings and clothes on washing lines etc).

monoxide, although not important greenhouse gases in their own right, can influence the atmospheric formation of other greenhouse gases, in particular ozone.

VOCs are indirect greenhouse gases in that they can break down in the atmosphere, in the presence of sunlight, to form methane and photochemical oxidants. VOCs are also precursors of ground level ozone, which is primarily formed by a series of complex reactions, initiated by sunlight, between VOCs and NO_x. Ozone is produced naturally in the upper atmosphere (stratosphere) where it helps to provide protection against incoming UV radiation. In the lower levels of the atmosphere ozone is an irritant gas and has the potential to impact on local air quality.

10.3.3.1 Principal sources of atmospheric emissions

Sources of atmospheric emissions during construction

The most significant issues that could potentially impact on air quality and climate during construction are combustion gas emissions and nuisance dust.

The principal sources of combustion gases are the exhausts of vehicles and construction equipment, power generation at the work camps and pipe storage yards and waste incineration. During testing and commissioning of the pipeline there will also be emissions of methane and combustion gases as a result of venting of gas and power requirements respectively.

Dust will be generated as a result of vehicle movements and typical construction activities (eg stripping, compacting and trenching etc).

Sources of atmospheric emissions during operation

During typical operation the main source of atmospheric emissions will be fugitive⁵ VOC emissions from the block valve stations.

Emissions of combustion gases are not normally anticipated from the block valve stations as it is anticipated that they will be principally powered through use of the gas pressure in the pipeline and that secondary power requirements (eg for control systems) will come from the national grid. Each block valve station will be equipped with a small (~7kW) diesel backup generator, which will only be used in the event of electricity from the grid failing.

Other minor sources are combustion gases from the exhausts of vehicles used to inspect and maintain the pipeline and AGIs.

10.3.3.2 Impacts and mitigation – construction

Combustion emissions - construction

Emissions of combustion gases have been estimated for:

⁵ “Fugitive emissions” is a term used to describe releases of a substance from open (or area) sources rather than those that are discharged to the atmosphere in a confined flow or stream (eg a vent). Fugitive VOC emissions include leaks (eg from imperfect seals) but do not include vented releases.

- Diesel exhaust emissions from construction vehicles and plant required for pipeline construction
- Construction waste incineration at the construction camps
- Power generation at construction camps and pipe storage yards

Emissions of methane from putrescent waste and waste incineration at the construction camps are not included as they are not anticipated to be significant relative to the CO₂ from combustion emission sources, even considering the higher global warming potential per unit mass of methane.

Due to the nature of the construction process, emissions will not be constant and will fluctuate according to the operating periods for each item of plant and the combination of machinery being used at any one time. The location of emission sources will also change as the construction spread progresses along the pipeline route. Intensive construction activities will not generally be carried out at night. Potential receptors, such as residents in local villages and flora and fauna will not, therefore, be continually exposed to pipeline construction emissions for extended periods (ie generally no more than 1-3 months and limited daily exposure).

A summary of the combustion emissions resulting from the estimated 14 month construction period is presented in Table 10-5.

Table 10-5 Assessment of combustion emissions arising from construction activities over the entire 14 month construction phase in Azerbaijan

SOURCE	NO _x ⁽⁵⁾	CO	SO ₂	PM	VOC	CO ₂	CH ₄
	TONNES						
Pipeline construction	1,957	896	159	184	233	140,000	14
Waste incineration ⁽¹⁾	4	1	4	29	No data ⁽³⁾	2,000	No data ⁽⁴⁾
Power generation at construction camps and pipe storage yards ⁽²⁾	1,081	233	71	77	80	40,000	7
Total	3,041	1,129	234	289	313	183,000	21

Note: This inventory covers only the pipeline spread and does not account for construction of the AGIs as information is not available at this stage.

- (1) Based on the total estimated volume of waste incinerated for all camps.
- (2) Based on total power requirement, for all camps and storage yards, of 5.61 MW.
- (3) No data was available to enable estimation of VOC emissions from waste incineration, however VOC emissions from this source are not expected to be significant.
- (4) No data was available to enable estimation of methane emissions from waste incineration, however methane emissions from this source are expected to be negligible in comparison to CO₂ emissions.
- (5) As NO₂.

Although stack emission limits have been defined for some of the sources of combustion emissions arising from construction activities, these standards have not been used to estimate the emissions in Table 10-5. It is not appropriate to use stack emission limits to provide annual emissions data in the absence of corresponding stack parameters (eg diameter, efflux velocity, exhaust gas temperature, oxygen concentration). This level of detailed information is not available at the current stage of project design. In the absence of this data emission factors from various sources have been applied to generate emissions estimations. In general, the emission factors will over estimate emissions. They often do not account for emission control technologies. The emissions presented in Table 10-5 should, therefore, be taken as indicative, conservative estimates. Mitigation measures and the SCP project emission standards are discussed in more detail below.

The detailed methodology and assumptions used to produce these data are presented in Part 3, Technical Appendix.

Mitigation – combustion emissions arising from construction activities

For generators, construction vehicles and equipment a programme of regular maintenance will be implemented to ensure that fuel use is efficient and emissions are within acceptable limits.

New vehicles will be purchased to comply with the European Community emissions standards in force at the time of purchase. Older vehicles and equipment, not purchased ‘as new’, after the contract award will be maintained so that emissions levels are maintained at acceptable levels.

European efficiency and emission standards have been specified for diesel generators. For power generation during construction the following stack emissions standards will be achieved by each item of plant (as defined in the project HSE Requirements):

- Particulates 50mg m⁻³
- NO_x 150mg m⁻³
- SO_x 0.2% w/w S in fuel
- CO 150mg m⁻³
- VOCs and hydrocarbons 100mg m⁻³

At the construction camps atmospheric emissions from incinerator plant will meet emission limit values based on the requirements set out in:

- EU Directive 89/369/EEC of 8 June 1989 on the prevention of air pollution from new municipal waste incineration plants. (For domestic waste.)
- EU Directive 94/67/EC of 16 December 1994 on the incineration of hazardous waste.

The relevant limits are summarised in Table 10-6 below.

Table 10-6 Stack emissions limits for waste incinerators during the construction phase

SUBSTANCE	LIMIT (mg m ⁻³)
Domestic waste⁽¹⁾ (89/369/EEC):	
Sulphur Dioxide (SO ₂)	300
Carbon Monoxide (CO)	100
Organics (as total carbon)	20
Total Dust	200
Hydrogen Chloride (HCl)	250
Hydrogen Fluoride (HF)	4
Lead, Chromium, Copper and Manganese (Pb, Cr, Cu and Mn)	5
Nickel and Arsenic (Ni and As)	1
Cadmium and Mercury (Cd and Hg)	0.2
Hazardous waste⁽²⁾ (94/67/EEC):	
(daily 100% compliance, 30 minute average values @100% and 97% compliance)	
SO ₂	50, 200, 50
CO	50, 100
Total organic carbon (TOC)	10, 20, 10
Total dust	10, 30, 10
HCl	10, 60, 10
HF	1, 4, 2

Table 10-6 Stack emissions limits for waste incinerators during the construction phase

SUBSTANCE	LIMIT (mg m ⁻³)
Mercury (Hg)	0.05 (total)
Cd and Thallium (Tl)	0.05 (total)
Antimony (Sb), As, Pb, Cr, Cobalt (Co), Cu, Mn, Ni, V, & Tin (Sn)	0.05 (total)
Dioxins and furans	0.1 ngm ³ (total)

⁽¹⁾ Limits expressed at reference conditions: 273K, 101.3kPa, 11% oxygen, dry.

⁽²⁾ Limits expressed at reference conditions: 273K, 101.3kPa, 11% oxygen, dry or at 3% oxygen for liquid waste.

The following emission concentrations and exhaust gas parameters will be monitored at the incinerator stacks on a regular basis:

- Total dust
- CO
- Oxygen
- HCl
- Temperature
- Water vapour content
- SO₂
- TOC

The remaining substances will be monitored periodically, if required.

Air quality - combustion emissions

Release of combustion gases will result in an increase in concentrations of airborne pollutants, which have the potential to result in acute and/or chronic impacts on human health, flora and fauna.

To put construction emissions of NO_x, CO, SO₂, PM and VOC into a national context Table 10-Table 10-7 compares the SCP project annual construction emissions to the Azerbaijan Inventory for 1994 (the latest year for which data are available).

Table 10-7 Comparison of annual construction phase atmospheric emissions to Azerbaijan inventory

SOURCE	NO _x ⁽²⁾ TONNE	CO TONNE	SO ₂ TONNE	PM TONNE	VOC TONNE
SCP Construction ⁽¹⁾	2,607	968	201	246	268
National Inventory	113,000	174,000	48,000	No data ⁽³⁾	281,000
% SCP contribution	2.3	0.6	0.4	-	0.1

⁽¹⁾ Annual SCP construction emissions have been calculated from the totals for the 14 month construction period on a pro rata basis to enable direct comparison to the Azerbaijan National Inventory.

⁽²⁾ As NO₂

⁽³⁾ The 1994 Azerbaijan National Emissions Inventory does not report particulate matter.

Existing (background) concentrations are low (refer to Section 8.2 for more details), so the increase is not expected to cause concentrations to exceed the EU standards and WHO guidelines for the protection of human health and vegetation (EU and WHO standards/guidelines are presented in Table 10-4).

Relative to Azerbaijan national emissions the residual impact of construction emissions on air quality will be **Medium** for emissions of NO₂ but **Low** for emissions of CO, SO₂, PM and VOCs.

Climate - combustion emissions

Though emissions of CO₂ and methane are generally accepted as contributing to global warming the effect has not been quantified. To reduce the threat of global warming it is widely agreed that emissions of greenhouse gases need to be reduced on a global scale.

Each individual greenhouse gas has a different potential effect on climate per unit released. Global Warming Potential (GWP) provides a means of equating the potential contribution to global warming arising from different process units/activities which can generate different emissions. GWP is measured in terms of equivalent emissions of CO₂; hence the GWP factor of CO₂ is 1. CH₄ has a GWP factor of 2, ie an emission of 1 kg of CH₄ is defined as having 21 times the GWP of an emission of 1 kg of CO₂.

The construction phase will result in estimated GWP emissions of ~183,000 tonnes of CO₂ equivalent over 14 months. To put this into a national context, Table 10-8 below compares annual estimated CO₂ and methane emissions to the Azerbaijan Greenhouse Gas Inventory for 1994 and to predicted national greenhouse gas emissions for 2000 and 2005.

Table 10-8 Comparison of annual GWP of construction phase to Azerbaijan greenhouse gas inventory

SOURCE	EMISSION (TONNE)		GWP (TONNE CO ₂ EQUIVALENT PER YEAR)
	CO ₂	CH ₄	
SCP Construction ⁽¹⁾	156,000	18	157,000
National Inventory 1994	32,806,000	442,000	42,748,000 ⁽³⁾
National Inventory Forecast 2000	24,689,000	730,000	40,887,000 ⁽³⁾
National Inventory Forecast 2005	41,544,000	1,253,000	68,818,000 ⁽³⁾
% SCP contribution to 2005 emissions ⁽²⁾	0.4	0.001	0.2

⁽¹⁾ Annual SCP construction emissions have been calculated from the totals for the 14 month construction period on a pro rata basis to enable direct comparison to the Azerbaijan National Inventory.

⁽²⁾ SCP annual construction emissions have been expressed as a percentage of the predicted Azerbaijan national emissions for 2005, as construction is expected to start in 2004.

⁽³⁾ National GWP includes nitrous oxide (N₂O) emissions. The GWP figure for BTC does not account for N₂O emissions, as these are not anticipated to be significant relative to CO₂ and methane emissions from combustion sources.

Relative to Azerbaijan national emissions the residual impact of construction emissions of greenhouse gases on climate will be **Low**.

Nuisance dust

Construction activities and vehicle movements can cause dust agitation in addition to that already caused by the wind. It is likely that this will be exacerbated as a result of clearance of the right of way. Once airborne, dust will generally travel down wind before resettling. The distance travelled depends primarily on wind speed and particle size. For example, smaller

particles and strong winds result in greater dilution effects but mean that the dust is deposited over a larger area.

Dust may cause nuisance on a local scale in certain areas along the pipeline due to the nature of the fine clayey, silty and sandy soils that are present. The potential impacts are nuisance to people in the area, coverage of crops (possibly leading to reduced yields) and deposition on natural vegetation and small animals, including bees.

Mitigation and control measures for nuisance dust emissions

The contractor will employ adequate dust reduction measures to prevent wind erosion and local pollution where necessary (at many locations along the route dust generation is not likely to be an issue). These techniques will include one or all of:

- Damping down of running track
- Wheel washes where appropriate
- Imposition of a speed limit of 30kmhr⁻¹ on unmade roads under dry conditions
- Correct storage and handling of materials that may give rise to nuisance dust emissions

When raw materials that could release dust particles (eg concrete and stone) are transported they will be treated and handled in a manner that minimises the release of dust. If necessary, the vehicle load will be covered with a sheet.

Dust generation and levels in the air will be monitored during construction near communities and certain agricultural areas when necessary. Additional mitigation measures, such as the imposition of tighter speed limits, will be implemented if necessary to meet acceptable standards.

Air quality- construction dust emissions

The long-term impact of nuisance dust will decline as stripped areas of land re-vegetate. Due to the temporary nature of construction, dust emissions are not anticipated to have a long-term impact on local air quality. The short-term residual impact arising from pipeline construction activities is anticipated to be **Medium**.

10.3.3.3 Impacts and mitigation – operation

Air quality - operation

There are no impacts on air quality anticipated as a result of operation of the SCP pipeline.

Climate - operation

Annual operational emissions of methane have been estimated for block valve stations for:

- Fugitive emissions from valves and connections
- The periodic stroking of the gas-actuated valves

Methane emissions were estimated on the basis of the predicted characteristics of the block valve stations and are summarised in Table 10-9 below. The detailed methodology and

assumptions used to produce these data are presented in Part 3, Technical Appendix. Whilst it is not possible to eliminate such emissions entirely, the design will be to a high specification and the facilities will be maintained to a high standard.

Table 10-9 Annual operational emissions of methane

SOURCE	CH ₄ EMISSION ⁽¹⁾ (TONNE)
Gas Actuated Valves	0.01
Other valves	3
Connections	1
Total	4

⁽¹⁾ For all five block valve stations

To put this into a national context, Table 10-10 below compares annual estimated methane emissions to the Azerbaijan Greenhouse Gas Inventory for 1994 and to predicted national greenhouse gas emissions for 2000 and 2005.

Table 10-10 Comparison of annual GWP of operational emissions of methane to Azerbaijan greenhouse gas inventory

SOURCE	CH ₄ EMISSION (TONNE PER YEAR)	GWP (TONNE CO ₂ EQUIVALENT PER YEAR)
SCP Operation	4	84
National Inventory 1994	442,000	42,748,000 ⁽¹⁾
National Inventory Forecast 2000	730,000	40,887,000 ⁽¹⁾
National Inventory Forecast 2005	1,253,000	68,818,000 ⁽¹⁾
% SCP contribution to 2005 emissions	3.2×10^{-4}	1.2×10^{-4}

National GWP includes CO₂ and nitrous oxide (N₂O) emissions. The GWP figure for SCP operational emissions does not account for CO₂ or N₂O emissions, as these are not likely to be released

Mitigation of fugitive emissions

Mitigation to reduce fugitive emissions of methane will be incorporated into the engineering design of the facilities.

Residual impact of fugitive methane emissions on climate will be **Low**.

Nuisance dust

During operation, the number of vehicles and the use of vehicles on un-surfaced roads, and hence disturbance to the ground surface will be very low.

Dust mitigation

Dust mitigation measures, including appropriate driving speeds and the use of designated accesses will, however, still be implemented.

The residual impact of dust emissions from vehicle use during operation will be **Low**.

10.3.4 Noise

Noise emissions may arise from:

- the maintenance and use of vehicles, plant and equipment during construction
- any piling and drilling activities during construction
- drying and venting activities during testing and commissioning
- operation of the AGIs

10.3.4.1 Construction noise impacts

This assessment has been prepared using the most recent, typical noise data available for pipeline construction activities and the anticipated duration of such operations.

The pipeline construction contractor's responsibilities will include reference to this ESIA prior to commencement of site operations and the submission of comparative data for noise and vibration levels associated with the operations and plant items proposed. No blasting is anticipated.

Standard pipeline construction

Activities associated with standard pipeline construction methods have been cross-referenced with standard noise source data to give the most accurate estimate of site noise possible at this stage. These values have been calculated using the procedures described in BS5228. Table 10-11 below shows typical noise levels that may be expected at various distances from the ROW.

Table 10-11 Typical noise levels associated with various construction activities

L_{Aeq} [6](dB) CALCULATED FROM BS 5228 AT VARYING DISTANCES FROM ROW					
CONSTRUCTION ACTIVITIES	50M	150M	250M	350M	450M
Initial access & fencing	76	67	62	59	57
Site preparation & right of way	74	65	60	57	55
Topsoil stripping & site grading	82	72	68	65	63
Pipe haul & stringing	83	73	69	66	64
Cold pipe bending	73	63	59	56	54
Mainline welding	79	70	65	62	60
Trench excavation	79	70	65	63	60
Pipe lower and lay & tie-in	75	66	61	58	56
Backfilling	72	62	58	55	52

Due to the nature of the construction process, noise levels will fluctuate in line with operating periods for each item of plant and with the combination of machinery being used at any one time. Noise levels will also vary depending on time, and distance as the construction spread progresses along the pipeline route. Local residents will not, therefore, be continually exposed to the noise levels shown above for extended periods.

Specialist pipeline construction

Specialist teams will work along the pipeline route in advance of and following behind the main construction team. These are teams for initial preparation and final reinstatement works and for special works, such as major road, railway, river and canal crossings. Particular aspects

⁶ L_{Aeq} is the A-weighted continuous equivalent sound pressure level, an average value used to represent fluctuating noise sources, as heard by the human ear.

of construction-related noise are described in greater detail below. Preliminary crossing methods for major linear features have been identified and will be finalised upon appointment of a construction contractor. Noise emissions associated with special crossing methods will be assessed on a case-by-case basis.

Road traffic noise

Construction traffic associated with the pipeline construction will be routed via main roads and along the ROW as far as is possible (eg the main Baku - Tbilisi highway). Some minor roads will have to be used for access to the pipeline spread itself and some new access roads will be created.

The increase in traffic movements on minor roads may cause a noticeable increase in daytime noise levels through small villages; this effect will be localised and temporary, and will, for the most part, be restricted to the construction phase of the project.

A number of roads will require repair prior to use for construction vehicle access. These repairs will help to reduce noise levels generated by such access, and other vehicular movements

Blasting

The vast majority of the pipeline trench will be constructed in materials which can be excavated by back hoe or trenching machine. Such materials include unconsolidated clays, sand, gravel and friable rock. No requirement for blasting is anticipated in Azerbaijan, and excavation is therefore likely to result in relatively low levels of noise and vibration.

10.3.4.2 Construction noise mitigation

Some noise impact on the surrounding environment and nearby residents is inevitable during any construction operation. Regular maintenance, monitoring and, where necessary, the use of silencing equipment will be employed with the aim of reducing noise emissions.

In order to reduce significant disturbance from noise emissions to neighboring residents, the following mitigation measures will be adopted:

- The selected contractor will be required to submit detailed information on the noise levels which will be generated by the specific methods and equipment proposed and to identify actions required to minimise the noise impact
- All vehicles, plant and powered equipment will be well maintained and adequately silenced
- Vehicles/ equipment purchased 'as new' after contract award will comply with European Community emission standards in force on the purchase date
- Vehicles/ equipment not purchased 'as new' after contract award will be maintained so that noise and emissions levels are no greater than when the vehicle/equipment was new
- Pumps, generators and other mobile equipment will be sited as far as practicable from housing and other noise sensitive locations
- The contractor will meet agreed noise control targets as defined in the Section below. Compliance will be monitored and additional noise suppression techniques applied as required to meet the targets
- During periods of inactivity, equipment will be switched off whenever possible

- A limited number of construction activities may have to continue on a 24-hour basis. These include horizontal direction drilling, pipeline cleaning and hydrostatic pressure testing which are relatively low noise activities. Consultation will be undertaken with the relevant authorities in advance of any such operations
- Where appropriate, residents living near to the pipeline construction activities will be kept informed of the contractors proposed working schedule (through implementation of the Community Liaison Management Plan) and will be advised of the times and duration of any abnormally noisy activity likely to cause concern
- The contractor will be responsible for employing best practice techniques to avoid unnecessary noise from the sites, particularly at night

The above mitigation measures, which reduce the impact of construction activity noise, will result in a residual impact which is classified as **Low/Medium**.

Noise control targets

Control of noise from the normal activities associated with pipeline construction will be achieved by restricting normal working hours, and by the mitigation measures described above. All contractors will be required to meet the noise limits defined in Table 10-12.

Table 10-12 Noise control limits for construction of the SCP

	LAEQ DURING THE DAY (8 HOURS)	LAEQ DURING THE EVENING (1 HOUR)	LAEQ DURING THE NIGHT (5MINS)
At limit of the right of way and at the boundaries of camps and other sites	85dB(A)	65dB(A)	60dB(A)
At residences close to the pipelaying route	70dB(A)	60dB(A)	40dB(A)
At residences affected by the noise from camps and other sites	70dB(A)	50dB(A)	45dB(A)

Where:

- Daytime is dawn or 7 am (whichever is later) to dusk or 7 p.m. (whichever is earlier)
- Evening is from the end of daytime to 10 p.m.
- Night is from 10 p.m. to the start of daytime

If any limit is exceeded, or if there is a significant risk of exceedance, noise screening will be provided. This typically comprises:

- Earth mounds between the pipelaying activity and the dwelling (eg using trench spoil)
- Solid fencing of a height to screen the line of sight between the house and the construction activities

Screening will be provided for hospitals, medical facilities, schools, day and residential nurseries and residential geriatric homes at which any limit is likely to be exceeded. Where an affected dwelling is close to a semi-permanent site and noise targets are exceeded, or are at risk of exceedance (eg main camp), the contractor will be asked to consider improvements to the building, such as the replacement of doors or windows and eaves barriers.

10.3.4.3 Commissioning and testing

Commissioning and testing procedures are required prior to operation as described in Section 5, Project Description. These include hydrostatic pressure testing of the whole pipeline, section by section.

These hydrostatic test activities, which will each last for several days and nights, are extremely unlikely to give rise to significant noise levels along the pipeline itself, but pumps and air compressors are needed to fill and pressurise the pipeline at the test ends. Generators will also be required at selected locations along the route for security lighting at night.

The combined noise levels for one diesel pump and one generator predicted from BS 5228 are shown in Table 10-13.

Table 10-13 Combined noise levels from one diesel pump and one generator

DISTANCE FROM SOURCE (m)	50m	150m	250m	350m	450m
Noise Level $L_{Aeq,15min}$ dB	70	60	56	53	50

Generators and pumps will be sited to avoid close proximity to residences wherever practicable. In any areas where this is unavoidable, a combination of local screening and low noise equipment will be employed to ensure that night-time noise levels at residences are generally maintained below 50dB(A) which is classified as a **Low** residual impact of short duration.

10.3.4.4 Operation

The pipeline will be buried at least 1 metre deep and, therefore, the sound of the gas passing through it will be inaudible at the ground surface. Only at the block valves may there be a slight noise from exposed pipework and valves. In all cases, careful siting of the facilities will ensure that the noise that is produced does not impact on local residents.

Noise will be generated on occasions when gas may need to be vented under emergency conditions at the block valves. This would happen very rarely (if ever).

At the AGIs there may be some generation of low frequency noise which can travel over significant distances before being attenuated. This effect will be minimised through the design and selection of equipment before considering any other active methods. Other more traditional noise control methods can prevent the generation of whistles, whines, hums, screeches or other pure tones by above ground pipework, all of which can cause disturbance to local residents even at relatively low sound pressure levels.

Noise emissions control criteria will apply to the operation of the AGIs, dependent on local circumstances and prevailing background noise levels. The specific criteria applied in each case will be below a severity ranking of *low* and, where possible, will comply with the *very low* categorisation (see Section 7, Methodology, for severity ranking tables)

Exceptions can be expected, however, in areas where prevailing background noise levels are already exceptionally low (as defined in BS4142) and there is no additional mitigation achieved by matching this level. In such cases a criterion in the range between *low* and *very low* will be selected on the basis of ranges of prevailing background noise levels and other significant noise sources in the area.

At the block valves, noise during operation will be limited to occasional maintenance activities and visits for inspection purposes.

The residual impact resulting from operation of the AGIs on the ambient noise conditions will be **Low**.

Occasional road traffic movements associated with maintenance and operation of the pipeline will be insignificant in terms of normal traffic flows on local roads, and resultant noise impacts will be very **Low**.

10.3.5 Geology and geohazards

10.3.5.1 During construction

Impacts to geology will be limited as no blasting is expected to be necessary in Azerbaijan.

Landslides and debris flows can be triggered by human activity, including ground disturbance during pipeline construction. Every effort has been made during pipeline routing to avoid areas prone to landslides and debris flows, thereby minimising the potential impact.

Wherever possible the pipeline has been routed to avoid economic geological reserves, although the pipeline corridor is close to areas where sand and gravel extraction are practiced (downstream at the Kura East and Shamkir River crossings and upstream at the Tovuz River crossing). There may be slight disruption at the Kura East and Shamkir crossings during construction, due to the proximity of the extraction activity to the pipeline spread. There will possibly be a residual impact during operation as it may be necessary to restrict these activities (see below).

Oil and gas exploration and production has taken place along certain sections of the route and some areas are still active concessions. However, current production facilities have been avoided during routing of the pipeline and therefore impact on oil and gas reserves is unlikely. There will be no residual impact on oil and gas production.

10.3.5.2 During operation

Operation of the pipeline and associated AGIs is not expected to impact on the geology of the area. However, as the Section below describes, there are several risks to the pipeline due to the local geology.

Aggregate extraction

There may be a risk to the integrity of the pipeline from ongoing quarrying activities, particularly those at the Kura East, Tovuz and Shamkir river crossings. This is discussed in further detail in Section 10.3.8, Hydrology.

Geohazard risks

Several geohazard risks to pipeline integrity were discussed in Section 8. Those that are considered to be of risk to pipeline or AGI integrity can be summarised as follows (note geohazards relating to river crossings are discussed in Section 10.3.8):

- The pipeline crosses two major fault zones at KP26 to 29 and KP48 to 51. These areas are also more susceptible to landslide than other areas along the route.
- Medium density earthquake zones cover about one third of the length of the pipeline route, with more than 200 epicentres identified within 30km of the route since 1962
- Mudflows can occur which could lead to loading of buried pipes and displacement of surface structures
- Ground rupturing associated with mud volcano activity may cause subsidence or displacement along fissures and faults, although the occurrence of these hazards tends to be concentrated around the volcano vents
- The possibility of new mud volcano activity affecting the pipeline in the Mud Volcano Ridge area (KP25-28)

The majority of the risks to pipeline integrity, which are outlined above, have been mitigated during the engineering design phase for the pipeline and associated AGIs as outlined below. The residual risk associated with geohazards is incorporated into the Risk Assessment as discussed in Section 10.4, Unplanned Events.

Seismic activity risk minimisation

AGIs

The magnitude of the seismic force to be designed for has been minimised by choosing sites where the expected peak ground accelerations are low. All key buildings have been designed with resistance to seismic events as a prime consideration. The fabric of each building will comprise a steel-frame with metal cladding where appropriate. This type of construction is suitable for earthquake regions and the structural design has been carried out using appropriate design codes for such regions. The use of reinforced concrete framed structures has been avoided, as such structures are typically relatively inflexible and therefore susceptible to earthquake damage. Further, the design specifies that any building masonry shall be reinforced specifically to reduce the potential for earthquake damage.

Pipeline

Where the pipeline crosses active faultlines the trench design will be modified to accommodate anticipated differential ground movement induced by earthquakes. This reduces excessive stresses in the pipeline, which may lead to failure or loss of containment. The recommended mitigation at fault crossings includes the modification of standard trench cross sections to a trapezoidal shape such that differential lateral movement causes the pipe to raise out of the trench. Consolidation of back fill material will be less to allow the pipe to move more easily. Pipeline wall thickness has been increased at one location to provide additional pipe strength. Mitigation measures for each specific fault crossing location have been defined on a site by site basis on detailed crossing drawings, which will be adhered to by the construction contractor.

Mud volcano activity

The pipeline has been routed to bypass active mud volcanoes. Where the pipeline crosses the mud volcano ridge (which also contains active geological faults), the special trench construction for fault line crossing has been extended to account for differential movements. On the basis of current engineering design information, other mud volcanic hazards, such as mud flows, pose negligible threat to the current pipeline route and require no additional mitigation during construction.

AGI sites have been selected on level ground remote from areas susceptible to risk from mud flows caused by either seismic activity or mud volcanoes.

10.3.6 Soils

The details of the main impacts, proposed mitigation measures and residual impacts on soils during the construction and operational phases are discussed below. It is important to note that the main mechanism for mitigating the impacts from construction will be through adherence to the Reinstatement Specification, which has been summarised in the Project Description and in the Part 4, Technical Appendix. A Reinstatement Plan will be developed from this specification, as discussed in Section 14, Monitoring and Management. Certain elements of the Reinstatement Specification are summarised below, with reference to mitigation of impacts on soils. A more detailed discussion of the relative merits of the mitigation measures considered,

particularly in relation to areas where the residual impacts are significant, is contained in Section 12, Residual Impacts. Potential impacts on soil from contamination due to leaks and spills from plant during normal construction, operation and maintenance activities are addressed in Section 10.3.7, Contamination.

10.3.6.1 During construction

The construction of the pipeline will result in direct disturbance of soil. Topsoil and subsoil will be stockpiled for re-use in backfilling and reinstatement. Temporary camps for the construction workforce will also result in the disturbance of topsoil, which will be reinstated following construction. The establishment of permanent facilities will result in the permanent loss of soil from these sites. The resulting potential impacts and mitigation measures associated with soil disturbance are discussed in detail in the Sections below.

Compaction

Compaction of soils during construction may occur where the bearing strength is exceeded by the weight of construction vehicles. This is most likely on the ROW and access roads, which will be subject to repeated vehicle movements. Soil compaction alters drainage characteristics and decreases the ability of vegetation to re-establish.

Methods for minimising compaction are addressed in the Reinstatement Specification. In highly sensitive areas (particularly Gobustan), the impact of soil compaction will be mitigated, wherever possible, by undertaking construction activities during periods when the soil is least prone to compaction (ie avoiding very wet weather). In order to avoid compaction impacts outside the ROW, deviation from the ROW or access roads will be prohibited. During reinstatement, the back-fill material will be compacted to a similar value to the original surrounding soils to avoid subsidence as a consequence of rain water channelling. After backfilling, the running track will be tined where necessary to alleviate compaction in sensitive areas. The residual impact of construction activities on soil compaction will be **Low**.

Erosion

Topsoil stripping during levelling and grading of the ROW and the excavation of subsoil during trenching will break up the soil structure. Depending on the nature of the soil, this may lead to a temporary increase in erosion (from the topsoil and subsoil piles and the graded ROW).

Adequate reinstatement following construction will help the subsequent re-establishment of vegetation and thereby reduce the risk of soil erosion. As discussed above, a project specific Reinstatement Plan will be produced and will include mitigation for impacts to soils based on the following:

- Recreation of a stable landform that mirrors the pre-disturbed condition (eg contours, shape, level of compaction) as this will minimise the risk of preferential erosion and therefore facilitate natural revegetation
- Ensuring protection of topsoil through separation from subsoil and storage in a manner that, as far as possible, retains the soil structure and seed bank and minimises the risk of topsoil loss. The trench will be subsequently backfilled with subsoil, followed by topsoil.
- Establishment of appropriate mechanisms to stabilise the working width if temporary demobilisation of the pipeline spread is necessary

- Development of bio-restoration methodology to achieve the following objectives:
 1. To re-establish the pre-construction vegetation cover particularly the variety and distribution pattern of plant species
 2. To establish sufficient vegetation cover to minimise erosion of the ROW

The construction contractor will be required to ensure that the ROW exhibits no more than a moderate level of erosion potential. For the purposes of the SCP project, moderate erosion has been defined as less than 10 tonnes per hectare for a 1 hour duration, 10 year return period, storm. Sediment interception devices will be installed where there is a risk of sediment contained in rain water run-off contaminating water bodies.

The reinstatement works will be undertaken in a manner that achieves the following minimum standards:

- Very low risk of the depth of cover above the pipeline being reduced
- Very low risk of off-site pollution and sedimentation
- Low risk of damage to bio-restoration by washing-out of seeds and plants

Wherever practical, the subsoil will be graded during reinstatement to reflect the original profile across the working width and all other construction areas (camps, access roads etc.). In steep areas with highly erodible soils, the ground will be carefully profiled to ensure that the integrity of the pipeline is not compromised.

To facilitate natural revegetation of the right-of-way, the separately stockpiled topsoil and vegetation debris will be spread over the surface of the right-of-way following completion of grading. Once the topsoil has been replaced it will be stone picked to remove large stones, which are not in keeping with the surrounding soil texture. It will then be tined and cultivated as necessary to ensure effective re-vegetation.

Areas of sensitive natural habitats or high erosion potential will be seeded with a mixture of native plant species to facilitate revegetation; in some desert areas a nurse crop of annual grasses may be used to provide surface stabilisation while the slow growing desert plants re-establish. If deemed necessary by site restoration personnel, additional surface stabilisation measures will be adopted in areas of high erosion potential. Where necessary, erosion mats or hydroseeding will be used to assist in stabilising vegetation growth.

Additional reinstatement procedures that will be employed as necessary are summarised below:

- Upon completion of subsoil and topsoil reinstatement, disturbed areas will be inspected jointly by the construction contractor and SCP personnel for slope stability, relief, topographic diversity, acceptable surface water drainage capabilities, and compaction
- A target of a 70% cover of adjacent off ROW ground vegetation established within one year of planting will be set for most areas. This will minimise erosion and provide a sustainable, self-generating plant community under virtually all conditions. It is, however, recognised that the achievability of this target will be dependent on local conditions along the pipeline route and will be reduced for the desert sections.

Erosion is most likely to be a problem in the following areas along the route:

- Parts of the Gobustan semi-desert area with significant slope, particularly the Mud Volcano Ridge area (KP25-29)
- Intermittent sections of Badlands to the west of Ganja, KP351-399 including the approaches to the Hasansu river crossing (KP395.9-398)

These areas in particular already exhibit active erosion which could be exacerbated by construction of the pipeline if not managed correctly. This may also lead to accelerated erosion of the ROW and pipe trench following reinstatement, thereby risking the integrity of the pipeline. Additional mitigation to that outlined above has been adopted in order to manage the erosion problem in these areas. This is discussed in Section 12, Residual Impacts.

To minimise any potential impact following hydrostatic testing of the pipeline, the release of hydrotest water will be undertaken in a controlled manner in order to avoid soil erosion or scour. This will be detailed in the hydrotest method statement and is also detailed in the Reinstatement Specification.

Following mitigation by reinstatement in accordance with the Reinstatement Plan, the residual impacts of construction activities on soil erosion will be **Low** in most areas to **Medium** on the narrow ridges (Mud Volcano Ridge and Hasansu River approaches) and badland areas west of Ganja. These will therefore be discussed further in Section 12.

Topsoil storage

Prolonged storage of topsoil can lead to a loss in fertility of the soil as nutrients become leached out by rainfall. This process can lead to impaired vegetation growth once the soil is reinstated. In addition, prolonged topsoil storage can lead to the loss in viability of the seed bank contained within this soil. Storage of topsoil is addressed in the Reinstatement Specification, as summarised in Section 5.

To mitigate for these potential impacts, topsoil (where present), and subsoil will be kept separate and replaced in the correct order during backfilling and reinstatement. In order to prevent loss of fertility and degradation of the seed bank within stored topsoil (where present), the topsoil will be stored for as short a time as possible, allowing for engineering constraints. In the sensitive Gobustan desert area, topsoil will not be stripped from the ROW, since the depth of topsoil is minimal and the viability of the seed bank and subsequent re-establishment of flora is likely to be compromised by stripping. In this area, the working width will be reduced to decrease the impact on the sensitive habitat.

The residual impact on the viability of the soil and seed bank will generally be **Low**. However in Gobustan, the residual impact will be **Medium** (but over a more limited area) since vehicle movements and clearance due to initial grading of the ROW will disturb the topsoil and seed bank. The sensitive Gobustan habitat is discussed in more detail in Section 12, Residual Impacts in terms of residual impacts on soil, ecology and landscape.

Permanent loss of soil/agricultural land

Construction of the AGIs will include the excavation of top and sub soil. Although removed soils will be stockpiled for later use in bund wall construction, land levelling and/or site rehabilitation works, it will be permanently lost from its point of origin. Topsoil of any botanical value will be re-used elsewhere on the route. The residual impact of this is considered to be of **Low** significance as the quantities concerned are small.

10.3.6.2 During operation

Once the pipeline and associated AGIs are in operation there will be minimal additional impact on the soils of the area except where compaction is caused by vehicle movements. There may also be risks to the integrity of the pipeline due to soil salinity and erosion, as discussed below.

Compaction

Maintenance of the pipeline will require limited movement of vehicles along the permanent easement, which will lead to some disturbance and compaction of the soils. However, this will be minimal and will not cause a significant impact. Surveillance will not normally call for vehicle movements.

In order to avoid soil compaction and rutting in areas where the reinstated ROW might be used as an unauthorised short cut by vehicles, access will be blocked. This will be achieved by the construction of berms (or similar) of sufficient height (minimum 1.5m high) to provide a barrier to vehicles. Where possible, the berms will be tied to vegetation or rocks adjacent to the ROW to prevent traffic from circumventing the barrier. Where available, large rocks excavated during construction may be used as an alternative to earth berms. Residual impacts on soil compaction and rutting during operation will therefore be of **Low** significance where this mitigation is suitable. However in most areas along the pipeline, this is not a realistic and implementable form of mitigation, and in practice, mitigation will depend on persuading local people not to use the pipeline as a road. The residual impact is therefore regarded as **Medium** significance and is discussed further in Section 12.

Soil salinity

Risks to pipeline integrity during operation are present in the form of highly saline soils which could lead to accelerated pipeline corrosion in certain areas. Gypsum (hydrated calcium sulphate) is often found both on and just below the soil surface. The resulting saline conditions (in both soil and groundwater) are highly aggressive towards steel and concrete used in pipeline construction.

This has been mitigated through the design of the pipeline coating and cathodic protection (CP) systems. Ongoing mitigation will be provided through the regular monitoring and maintenance of pipeline and associated infrastructure, including the CP system, which will greatly reduce the risk of a pipeline leak due to corrosion. Residual risk to pipeline integrity has been taken into account in the Risk Assessment outlined in Section 10.4, Unplanned Events.

Erosion

Risks to pipeline integrity during operation are also present where highly erodible soils are crossed. Specific reinstatement methods developed as part of the construction contractors Reinstatement Plan will ensure that soil erosion will not be a risk to pipeline integrity during operation. Rigorous inspection and maintenance during operation will also minimise the risk to pipeline integrity due to erosion. Residual risk to pipeline integrity has been taken into account in the Risk Assessment outlined in Section 10.4, Unplanned Events.

10.3.7 Contamination

Contaminated land impacts and mitigation are addressed in this Section in terms of:

- Construction and operation of the pipeline in the presence of pre-existing contaminated land
- Contamination of the land due to pipeline construction and operational activities

Communicable diseases contained in soils are assessed as a social impact in Section 11.

10.3.7.1 Known existing contamination

Twenty three sites of existing contamination were recorded along the pipeline route as detailed in Section 8. The impacts of encountering both known or unknown contaminated soils during construction could be twofold:

- Risk to Health and Safety of construction personnel
- Risk of spreading contaminants into the wider environment

During pipeline routing areas of known contamination have been avoided where ever possible. Where this has not been possible, or where unknown contamination may be present, the ROW will be cleared to an appropriate standard (in terms of construction personnel HSE) of existing and recorded contamination prior to construction. Wherever possible the excavation of contaminated soil will be limited to the pipeline trench and clearance of fly-tipped waste from the working areas. When construction of SCP begins, it is likely that any contamination will have been previously cleared from the ROW during construction of the BTC pipeline.

The residual impacts of the construction activities on existing contaminated land are **beneficial** if it is cleared.

10.3.7.2 Unknown contamination

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

- Where the SCP crosses existing oil pipelines, which may have had underground leaks
- Where the SCP crosses watercourses where contaminants (particularly heavy metals) may have accumulated in river bed sediments, particularly on the outside bends of meanders. Pipeline crossings downstream from heavily industrial areas may therefore be at risk of contamination (it is considered, however that the Kura East crossing is the only crossing where this may be a significant risk).

If contamination is suspected sampling will be undertaken and if necessary for the Health and Safety of construction personnel, the contaminated soil will be removed. Wherever possible the excavation of contaminated soil will be limited to the pipeline trench.

The residual impacts of the construction activities on existing unknown contaminated land are positive if it is cleared.

10.3.7.3 Contamination during construction

Activities associated with construction have the potential to produce soil, groundwater and surface water contamination. The principal potential contaminants associated with the construction activities are as follows:

- Fuels and lubricating oils
- Domestic wastes
- Welding wastes and field welding and coating materials
- Paints and solvents
- Sewerage
- Hydrotesting chemicals if used (eg biocides, oxygen scavengers and corrosion inhibitors)

Soils, surface or ground water may become contaminated by fuel, oil and chemical spills from plant and by hazardous, non-hazardous or aqueous wastes. This will be mitigated by the use of a Pollution Prevention Management Plan (including protocols for managing hazardous materials as well as pollution control) and a Waste Management Plan. These documents will detail how hazardous materials will be stored and used in order to prevent spillage, how contaminated soil will be remedied if a spill occurs and how all types of waste will be disposed of to prevent contamination of the soil.

If a spill does occur, a detailed contaminated land cleanup strategy will be implemented as follows:

- The need for remedial work in any specific area will be determined on the basis of the observed contaminants, sampling and analysis to determine their concentrations and the risks that they may pose to local receptors (social and environmental)
- In the first instance, the Dutch IV guidelines will be used as screening values to determine whether additional risk assessment or remedial work is required. The Dutch IV guidelines are an internationally recognised method for assessing contaminated land. In the case of contaminants that are not included in the Dutch guidelines, internationally recognised alternatives may be used
- In each area of identified contamination, a site-specific remedial plan will be developed. The plan will include a summary of the environmental risks posed by the contamination and the procedures that are to be adopted to mitigate those risks
- The preferred options for the treatment of contaminated soil will be based on the risks posed by the material. In keeping with the aim of minimising the transportation of hazardous materials, preference will be given to *in-situ* and low technology remedial approaches

Remedial targets will be set on the basis of the Dutch IV values, other internationally recognised values or through a site specific risk assessment.

If a spill occurs, the potential impact will depend on the type and amount of the chemical that has been spilt and the sensitivity of the receiving environment. The residual impact on soils will generally be **Low** if the remediation strategy outlined above is followed, and considering the relatively small volumes of hazardous materials to be used during construction. Consideration of contamination due to unplanned events is discussed in Section 10.4.

All hydrotest water, which could potentially contaminate receiving waters, will be tested and treated prior to discharge. This will be covered in the Hydrotest Method Statement. The residual impact will be **Low**.

Where horizontal directional drilling (HDD) is undertaken, an HDD method statement will be developed by the contractor and agreed by the SCP management team. It will include a detailed soils assessment to minimize the risk of drilling mud leakage. It will also include procedures for cleanup if a leak occurs. Approved procedures for the disposal of drill cuttings will be included in the Method Statement. The residual impact will be **Low**.

10.3.7.4 Contamination during operation

Day to day operational activities such as fuelling of vehicles may have the potential to lead to unplanned releases of potential contaminants. These activities will be regulated and monitored within the framework of the operational Emergency Response Plan and Pollution Prevention Management Plan. The residual impact will be **Low**.

10.3.7.5 Workforce health and safety

The construction contractor will be required to develop a project specific Health and Safety plan. The plan will include a specific section on the management of Health and Safety risks associated with contaminated land.

10.3.8 Surface water hydrology and water quality

Each stage of the SCP project has the potential to impact on surface water resources as summarised in Table 10-14. Key concerns include the discharge of sediment into watercourses, releases of potentially toxic materials, disruption to flow rates and the loss of amenity of the waterways (eg contaminants entering the Shamkir and Mingechar Reservoirs which provide a major water resource for the whole country). The main surface water resources that could be impacted by the project are outlined in Table 10-3, together with proposed mitigation measures. The protection of surface water resources has been a fundamental consideration in the route selection and engineering design for the SCP and associated facilities. This emphasis will be continued throughout the construction and operational phases of the pipeline.

Ecology of surface watercourses, including fish spawning, is addressed in Section 10.3.12, Ecology and Protected Areas.

10.3.8.1 During Construction

Sediment Release

The principal hydrological impacts associated with the construction of the pipeline are anticipated to be those associated with the release of sediment. Sediment is considered a water pollutant because it reduces light levels within the water column and at the channel boundary, and can therefore impact freshwater ecosystems. High levels of suspended sediment also causes deposition and clogging within river gravel bars. Gravel bars are often important habitats; clogging can therefore be highly detrimental to fish communities by, for example, starving fish eggs of oxygenated water supplies.

Table 10-14 Principal surface water quality issues associated with the SCP project

PIPELINE PHASE	EXAMPLE ACTIVITY	POLLUTION SOURCE/ TYPE	POLLUTION PATHWAY	POLLUTION RECEPTOR
Construction	Vegetation stripping; soil removal; trenching; river disturbance at crossings; vehicle use; temporary camps	Fine sediment from erosion; spillages of fuel, lubrication oil, sewage wastewater & hazardous chemicals	Overland flow across soil surface; river systems; subsurface migration; groundwater flow	Downslope/downstream river, canal, ditch, lake reservoir, aquifer.
Testing	Cleaning and hydrotesting	Contaminated cleaning and hydrotest water (eg with chemicals; manufacturing residue/swarf/scale, sediment)	Overland flow across soil surface; throughflow via subsurface soil; groundwater flow	Downslope/downstream soil water, river, canal, ditch, lake, reservoir, aquifer, wetland
Operation & maintenance	Accidental spillage;	Fuel; lubrication oil; engine washdown; hazardous substances;	Surface contamination; throughflow via subsurface soil; groundwater flow	Downslope/ downstream soil water, river, canal, ditch, lake, reservoir, aquifer, wetland

A number of sediment-generating activities have been identified during construction, but will vary according to the final techniques selected, Vegetation has to be removed from the working width, exposing bare soil to rainwash, overland flow and freeze-thaw processes. Where there is a significant slope, consequent erosion may deliver fine sediments from the site to nearby rivers, where onward propagation can be fast and widespread.

The presence of high levels of suspended sediment concentration can also render potable water supplies unpalatable. In Azerbaijan, many of the rivers already contain high sediment loads, thus reducing the significance of additional sediment introduced during construction. Those rivers that are considered to be most at risk are recorded in Table 10-3.

Surface water contamination

There is a potential for pollution from chemical contaminants at all stages of the project. Spillage of fuel, lubrication oil or wastewater is potentially important at the watercourse crossings, construction facilities and block valves during construction, testing, maintenance and operation. Contaminants introduced by construction and operational phase plant could migrate downstream to key receptors such as Mingechar and Shamkir Reservoirs or sensitive ecological areas such as the Karayazi Wetland (Kurudera crossing), or the Barda State Forbidden Area (Kura East Crossing). Migration to these key receptors could take place very quickly - in a matter of a few hours in some cases. River crossings where the risk of impact on downstream receptors could be significant have been recorded in Table 10-3.

Although the likelihood of a major loss of gas from the SCP to a watercourse is considered to be very low, the potential impacts of such a loss could be significant and could adversely affect sensitive habitats. This is discussed further in Section 10.4, Unplanned Events.

Flow rates

Flow quantity is often as important as water quality in rivers. Interruption of river flows has the potential to adversely impact ecological sustainability, fisheries, water abstractions and waste dilution downstream. It should be noted that the flow characteristics of Azerbaijan's rivers are typically highly seasonal and that many river crossings may be dry or at low flow from August to February.

Mitigation during construction

River crossing points have already been determined through pipeline routing surveys to ensure that the crossing points minimise the impact on sensitive hydrological and ecological features. This includes adequate design controls to minimise the impact on the hydraulic regime of the rivers.

To minimise impacts at particularly sensitive rivers (as outlined in Table 10-3), the following measures will be implemented:

- The designation of sensitive river crossings as trenchless, or seasonally constrained open-cut, to minimise impact on spawning and migration of fish (generally between October and May) (Table 10-3) and to minimise the generation of suspended solids
- The timing of pipeline construction at certain river crossings, in particular the Ganjachay, Shamkirchay, Zayamchay and Tovuzchay Rivers will reflect their highly seasonal flow regimes (Table 10-3). Wherever possible, construction of the pipeline crossings will be undertaken during periods of low flow
- Oil spill clean up equipment will be available at significant water crossings for quick response should a spill occur. Personnel will be trained to use such equipment. The type and quantities of equipment will be agreed before construction begins
- Training of appropriate personnel will be carried out to educate them on the environmental sensitivities of river crossings
- Wherever practical, to avoid oil and diesel pollution, vehicles will not travel through rivers and watercourses when water is present. Vehicles will therefore use flume pipe crossings or work from pontoons and barges; alternatively draglines will be used to dig the pipeline trench through active watercourses. Refuelling will not take place within 30m of a watercourse and drip trays will be used under standing plant
- Restore banks as much as possible to their pre-existing contours. A revegetation plan is to be prepared as part of the Reinstatement Plan and submitted by the contractor prior to the commencement construction
- Sediment traps (straw bales or purpose-built barriers/bunds or settling tanks) will be used to trap sediment-laden runoff from the ROW

Seasonally high loads of suspended solids are a common natural occurrence in many of the rivers in Azerbaijan. However, there is a need to ensure that these are not increased significantly, and that potential impacts on fisheries, particularly in the Kura, are minimised. Fish migration and spawning occurs most commonly between October and June. This has been taken into consideration at certain river crossings where construction constraints have been specified, as detailed in Table 10-3.

Management Plans

The protection measures to be implemented during the project with the aim of minimising impacts on surface water resources will be incorporated into a number of management plans (as described more fully in Section 14, Monitoring and Management). The plans with particular pertinence to watercourse crossings are listed below:

- An Emergency Response Plan, which will detail actions to be taken if a contaminant enters a watercourse. This may include the use of spill clean-up kits (kept in vehicles) and the deployment of booms and absorbents at designated river crossings
- A section on sediment and erosion control within the Reinstatement Plan, identifying sections with the highest risk of erosion and/or excess sediment generation. This document will also identify temporary erosion control measures to be implemented at these locations
- A section on wastewater management within the Waste Management Plan, addressing the disposal of black and grey waters, generated during construction
- The Pollution Prevention Management Plan which will detail how to store and handle hazardous materials with respect to the prevention of surface water contamination

River Crossing Method Statements

In general, River Crossing Method Statements will detail how each river will be crossed, including:

- Storage of channel bank and bed material separate from topsoil and subsoil
- Reinstatement of the river banks and bed, which may require the use of rip rap or gabions to reinforce the river banks at the crossing points and prevent erosion in the future
- The use of sediment filters and sediment fencing to reduce sediment release into rivers
- Installation of temporary flumes to channel the river flow away from construction works and to form bridges across watercourses (where necessary)

The contractor will prepare specific Method Statements for the crossing and reinstatement of wadis, including actions to be taken in the event of a flash flood.

Where horizontal directional drilling (HDD) is undertaken, an HDD Method Statement will be developed which will include a detailed soils assessment designed to minimize the likelihood of drilling mud leaking into a watercourse. Appropriate disposal of drill cuttings to avoid ingress into watercourses will also be included in the Method Statement.

Within those areas which could be liable to flooding at the time of construction, further measures will be adopted to reduce the potential impact of the works in the event of a flood, including:

- Minimising temporary storage of material above ground level
- Immediate removal/disposal of surplus material off site
- Provision of drainage/gaps within soil bunds to reduce influence upon the drainage pathways of flood water, etc
- Replacement of any flood defence banks breached by the pipeline

Following implementation of the above mitigation measures, the residual impact on hydrology is generally considered to be **Low** for most rivers. Rivers with a particular environmental sensitivity are listed in Table 10-3, together with specific mitigation measures that will be applied (including non-open cut crossing methods and seasonal constraints on construction). Those rivers where the residual impact remains **Medium** are:

- Djeyranchemes
- Hasansu

- Kura West

At all three locations, engineering considerations preclude the use of non open-cut techniques. The residual impacts on these rivers are discussed in more detail in Section 12, Residual Impacts.

10.3.8.2 Hydrotesting

Cleaning and hydrotesting will be carried out prior to pipeline commissioning. The volumes of water required are potentially significant. The sources available in arid and semi-arid areas are restricted and heavily committed for potable, industrial and agricultural uses. It is likely that the Kura River will be utilised as the main source of hydrotest water.

The appropriate consents will be obtained for any abstractions from, and discharges to, watercourses. Any cleaning and hydrotest water which could cause contamination of surface (or ground) waters will be tested and treated as necessary prior to discharge, including debris and sediment removal. The contractor will prepare a Hydrotest Method Statement, which will include contingency plans in the event of a leak. The main concerns will be the introduction of hydrotest chemicals and eroded sediments into a watercourse close to, and upstream of, a potable abstraction point or fish spawning area.

Temporary storage ponds or tanks may have to be built to provide buffer storage if it is necessary to even-out abstraction rates or remove sediment from the source water, and also to facilitate any treatment required prior to discharge.

Local communities will be consulted on the abstraction, discharge and re-use of hydrotest water.

The principal hazard introduced by hydrotesting is the very unlikely event of a failure of the line under test, resulting in the unplanned discharge of water. This could result in local erosion on steep slopes, particularly in poorly consolidated soils. However, the presence of very low gradients along most of the SCP route in Azerbaijan suggests that slope erosion is unlikely to be very significant.

Following implementation of the mitigation measures described above, the residual impact on hydrology as a result of hydrotesting is likely to be **Low**. However, at this stage, the exact volumes of hydrotest water required, length of pipe to be hydrotested in each test and the extent to which hydrotest water will be reused between test sections cannot be specified. This may increase or decrease the impact accordingly and will be assessed once the details are known.

10.3.8.3 During operation

Risks to pipeline integrity associated with the hydrological regime of the rivers crossed by the pipeline are discussed in Section 8, Baseline and can be summarised as follows:

- Highly variable flow rates and bed materials will affect river dynamics in terms of bank erosion and bed scour potential. This will influence the burial depth beneath the bed of the river that is required to protect the pipeline's integrity
- There is a risk to pipeline integrity from river mud flows, which can be significant events in at least seven rivers crossed by the pipeline

- There is active sand and gravel extraction occurring in the river beds of the Kura East, Shamkirchay and Tovuzchay Rivers that has potential to impact upon pipeline integrity (Table 10-3)

Washout and scour are distinct possibilities at river crossings and could compromise the functioning of a pipeline. Many of the rivers crossed by the SCP are seasonally active and capable of eroding their banks and bed. Lateral mobility and bed scour are possibilities at a number of river crossings, especially the Shamkirchay, and the Kura West and Kura East, and possibly the Tovuzchay.

In the Gobustan region, the pipeline route crosses many wadis, the largest of which is the Djeyrankechmes. These wadis rarely contain flowing water, but on occasion high intensity rainstorms can cause flash floods and the wadis are then subject to very high flows and sediment transport rates.

High-intensity rainstorms combined with substantial snowmelt upstream of the pipeline route in many rivers, particularly those between the Kura East crossing and the Georgian Border, can also cause flash floods; it is therefore important to ensure that the river channels are not restricted. It should be noted that many key rivers (eg Kura, Shamkirchay, Ganjachay and Tovuzchay) have control devices, such as dams, upstream from the pipeline crossing point. This serves as a mechanism for irrigation and water supply for upstream communities, but will also reduce the impact of flood events at the crossing points.

All of these risks have been and will continue to be taken into account during the design and execution phase of the project. The risks to pipeline integrity during operation due to bed scour will be taken into account during the detailed engineering design phase which will ensure that the pipeline is buried to a sufficient depth below the river bed. Lateral scour will be allowed for by incorporating adequate set-back distances into the design of each crossing.

During operation, monitoring of river crossings will be undertaken. Channel erosion will be monitored at least at the locations of major watercourse crossings (Agsu Canal, Turianchay, Kura (East and West), Karabakh Canal, Kurekchay, Ganjachay, Shamkirchay, Zayamchay, Tovuschay and Hasansu).

In those rivers where Third Party sand and gravel extraction or long term changes in river bed dynamics may affect the integrity of the pipeline, the following mitigation measures are proposed:

- Close consultation with the owner/operator and agreement with the Licensing Authorities for the Kura East, Shamkirchay and Tovuzchay sand and gravel extraction operations to raise the level of awareness about the risk to pipeline integrity
- Consideration of increased burial depth of the pipeline at the Shamkir crossing, to accommodate not only future aggregate extraction activities, but also the potential bed scour depth during periods of flash flood
- Increased surveillance of the pipeline route across these rivers
- Monitoring of changes in channel cross section at all crossings

The residual risk associated with the geohazards at river crossings has been incorporated into the Risk Assessment discussed in Section 10.4. The residual impacts are considered to be **Low**.

10.3.9 Hydrogeology (groundwater)

The main impacts on groundwater due to pipeline construction and operation are:

- Impact on Groundwater Quality
- Impact on Groundwater Flows

Impacts on groundwater quality resulting from accidental events during operation of the pipeline are discussed in Section 10.4, Unplanned Events. General mitigation for impacts on groundwater quality are outlined in Section 10.3.8, Surface Water Hydrology, since they are also applicable to surface water quality. These issues are therefore not discussed in detail in this Section.

10.3.9.1 Impact on quality of groundwater

During construction and operation, spills, discharges or leakages of a variety of substances could have an impact on groundwater quality (Table 10-15).

Table 10-15 Potential groundwater contamination-related hazards during construction and operation of SCP

ACTIVITY	POTENTIAL HYDROGEOLOGICAL IMPACT
GENERAL ACTIVITIES DURING CONSTRUCTION AND OPERATION	
Vehicle, plant and equipment; fuel and oil leaks	Contamination of soil or groundwater by hydrocarbons
Storage, handling and disposal of hazardous materials	Contamination of soil or groundwater by variety of substances (lubrication fluids, solvents, paints, oils)
Production of solid wastes	Disposal, degradation and leaching of wastes releasing contaminants to groundwater.
Disposal of waste water and sewage	Disposal of waste water if to ground, may result in contamination of groundwaters by micro-organisms, detergents, nitrates
SPECIFIC TO CONSTRUCTION OF PIPELINE	
Drilling (HDD or abstraction well construction)	Contamination (due to increase in suspended solid content) of groundwater by drilling fluids or leaching of drilling cuttings
Cleaning and hydrostatic testing of pipeline	Possible contamination of groundwater by hydrotest chemicals, or by imported test water of different quality to local ambient groundwater (salinity, redox etc.)

The important factors when determining the magnitude or likelihood of an impact on groundwater are the:

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

The areas most likely to be impacted are between Yevlakh and the Georgian border where groundwater is heavily abstracted and is close to the surface (often within 1-2m). The Karayazi Aquifer (from the Kura West crossing at KP411 to the Georgian border at KP442) is particularly vulnerable as it is overlain by permeable sands and gravels.

The main mechanisms available to ensure mitigation against adverse impacts on groundwater quality will be the development of, and adherence to, a Pollution Prevention Management Plan, a Waste Management Plan and an Emergency Response Plan, as well as an HDD Method Statement and a Hydrotest Method Statement, as described in Section 10.3.8, Surface Water Hydrology.

Any hydrotest water that could cause contamination of groundwaters (eg due to salinity or the presence of other contaminants) will be tested and treated prior to discharge. This will be covered in the Hydrotest Method Statement.

The Emergency Response Plan will detail actions to be taken if significant quantities of a contaminant are released to the subsurface. The likely required elements of such a plan with respect to groundwater contamination are discussed further in Section 14, Management and Monitoring.

Measures to prevent groundwater contamination will be especially stringent in the valleys of the rivers of the Ganja-Kazakh Piedmont Plain, on the Kura floodplain and on the Karayazi Plain, as these are the most hydrogeologically sensitive parts of the SCP route.

Following implementation of the mitigation measures outlined above, the significance of the residual impact on groundwater quality from construction is considered to be **Low**.

Impacts on groundwater during operation are only likely to result from small scale leaks and spillages during pipeline surveillance and maintenance of the AGIs; they are considered to be **Negligible**.

10.3.9.2 Impact on groundwater flows

Physical presence of pipeline

The pipeline will be buried, with the top of the pipe at least one metre below ground level and the pipeline typically lying at between one and two metres below ground level. Along the majority of the pipeline route it will thus lie above the water table. The physical impact on groundwater flow will therefore be **Negligible**.

Pipe trench as a rapid flow conduit

The backfilled trench material, even if compacted, may have a higher permeability than the undisturbed strata. Thus, the pipeline trench may act as a 'rapid flow' conduit for groundwater if:

- The water table is shallow or the area is subject to high precipitation rates
- The terrain has a gradient
- The soils/subsoils are of low permeability

This, in turn, may lead to:

- Subsurface erosion/outwashing of fines from the backfill material
- Lowering of groundwater levels along the trench at higher terrain elevations
- Waterlogging and/or appearance of springs where water discharges from the trench at lower elevations

Placing trench breakers where necessary to impede the movement of groundwater along the trench, will mitigate this potential impact. Following mitigation, the residual impact will be of **Low** significance.

Derogation (lowering of groundwater levels) due to abstraction

Groundwater levels may be impacted by abstraction for the supply of water to construction camps and operational facilities. Abstraction of groundwater causes a temporary depression of the water table in the vicinity of the abstraction point (the radius of influence). This drawdown may have an adverse effect on the yield of nearby boreholes, wells, springs and karizes. Springs, karizes and shallow dug wells, most commonly used by poorer sections of the community, are especially vulnerable to small declines in the water table. Similarly, wetlands supported by groundwater, such as the Karayazi Wetland, may be highly sensitive to declines in the water table.

The shape, depth and extent of the cone of depression of the water table around an abstraction well depends on the transmissivity and storage properties of the aquifer and on the recharge of groundwater to the aquifer. When abstraction ceases, if other factors do not materially change and natural recharge is effective, the water table will normally recover to its original level.

If groundwater is abstracted for construction or operation of the pipeline, the following procedures will be undertaken:

- The transmissivity and storage properties of the aquifer will be estimated from current information
- The likely radius of influence of the proposed abstraction point will be calculated
- Abstractions (boreholes, wells, springs, karizes) or environmental features (wetlands, springs, streams or surface water features in continuity with groundwater) will be identified within the likely radius of influence of the abstraction point
- Permission/licence to drill and abstract groundwater will be obtained from the relevant Azerbaijani Authorities
- The abstraction borehole, when completed, will be test pumped. During the test pumping, other features (as listed above) will be monitored
- Abstraction rates will be adjusted to ensure that existing uses will not be compromised

Although it is difficult to assess the significance of the residual impact at this stage, as it will vary on a case-by-case basis, with the implementation of the mitigation proposals outlined above, the residual impact is likely to be **Low**.

10.3.10 Landscape and land use

The aspects of the project that will impact on the landscape of the area are the temporary use of land for construction (ROW, roads, construction camps and pipe yards) and the permanent adoption of land for AGIs and access roads.

10.3.10.1 During construction

The ROW and the temporary facilities will be visible from the time of vegetation or topsoil removal until reinstatement is complete and vegetation has re-established fully.

All disturbed areas will be reinstated in accordance with the Reinstatement Specification (summarised in Part 5, Technical Appendix) and the contractor will be required to develop and

implement a Reinstatement Plan as described in Section 14, Management and Monitoring. One of the main objectives of reinstatement of the pipeline route is to return the visual integrity of the landscape as closely as possible to its previous condition. Reinstatement techniques are constantly evolving and improving so high standards of reinstatement can usually be achieved.

Past experience suggests that arable land and pasture will recover fully within three years of reinstatement; semi-natural habitats with slow growing plants may take longer as discussed in Section 10.3.12, Ecology. In the context of this pipeline it is expected that most of the semi-desert and desert areas will recover visually within 5-10 years of reinstatement. However, in Gobustan, where the plant communities are dominated by exceptionally slow growing species, recovery may take up to twelve years (refer to Section 10.3.12). Specific mitigation measures for Gobustan are described in Section 10.3.6, Soils.

At a number of locations, the pipeline crosses linear features such as lines of trees, watercourses, lanes or tracks. These features form important visual focal points along the route, which will be disrupted until reinstatement and regrowth of vegetation is complete. Wherever possible the removal of existing mature trees will be avoided. Provided that the integrity of the pipeline is not jeopardised, any removed trees will be replaced during the reinstatement phase using indigenous species, preferably of local provenance. It will be necessary to protect newly planted trees from grazing animals.

In areas where grading of the working width impacts on the local topography, reinstatement will be undertaken in a manner which is generally sympathetic to the existing contours. At most locations the disturbed ground will be indiscernible once the vegetation has re-established and the residual impact will be **Low**.

There are, however, locations along the route where extensive grading will have been undertaken for construction of the BTC pipeline to provide a level working area. This particularly applies to the Mud Volcano Ridge area (KP26–28), the approaches to the Tovuzchay and Asrinchay Rivers (KP375.6–377), the approaches to the Hasansu River (KP395.9–398) and scattered locations where the pipeline crosses a side slope (ie it runs approximately parallel to the contours). At these locations the areas previously levelled for construction of the BTC pipeline will be used for installation of the SCP to avoid causing additional impacts. Furthermore, a reduced separation distance between the BTC pipeline and SCP will be used. There will therefore be no visual impact resulting from grading of the SCP route *per se*.

During construction, the permanent access roads and facilities will present similar visual impacts to the temporary facilities, but they will continue to be visible throughout the operational phase of the project (as discussed below).

In all areas of construction activities, items such as large plant, earthworks, pipe joints and other vehicles will be visible throughout construction. This is a temporary impact, the duration of which will be minimised by the prompt removal of vehicles, plant and materials on completion of the works.

The disposal of waste from construction activities will be strictly in accordance with the Waste Management Plan (Section 14, Management and Monitoring). Disposal will be restricted to approved locations which will be subject to an environmental review. Among other considerations, disposal will only be allowed at locations where the waste can be adequately screened from sensitive viewpoints.

Monitoring programmes will be instigated to ensure that all proposed mitigation measures are being applied and are effective.

10.3.10.2 During operation

Pipeline

Once the temporary working areas have been reinstated, the majority of the landscape will return to its former condition. The buried pipeline will therefore have minimal visual impacts during its operational life. The only persistent visual impacts will take the form of:

- Aerial and pipeline markers required to identify the route. Although permanent, they are considered to have a **Low** residual impact
- Levelled ridges at specific locations as discussed above

It is possible that some sections of the pipeline route will be used as a vehicle track following reinstatement. In this event, the erosion risk will be increased and recovery of the vegetation will be slowed or prevented. This will increase the duration and potentially the magnitude of visual impact. Environmental management procedures for the operational phase will prevent the workforce from driving along the reinstated ROW except in an emergency. With the implementation of these mitigation measures, and taking into account the many existing tracks along the general alignment of the pipeline, the residual visual impact is considered to be of **Low** significance. Further discussion of mitigation measures to prevent vehicles using the ROW for access is given in Section 12, Residual Impacts.

Facilities

The block valve stations will remain visible throughout the operational phase of the SCP. They have been designed to minimise outward light emissions and will not normally be lit at night. The residual impact resulting from their presence is assessed as **Low**.

10.3.11 Cultural heritage and archaeology

The aspects of the project, which could impact on archaeological deposits, are:

- The removal of topsoil and subsoil during preparation of the ROW, facilities and access roads
- Trenching

Once the pipeline is operational, there will be no further impact on archaeology or cultural heritage.

Activities associated with the construction of a pipeline may affect the archaeological record by physically damaging part or all of an archaeological monument. These features may be known prior to construction of the project, or may be discoveries of previously unsuspected sites. Although evidence is physically lost, if the site is properly excavated and recorded, the information obtained can be studied by future generations and will add to the general understanding of the history of the area. A linear project creates an increase in knowledge both in previously explored areas, and also in locations where archaeological surveys have not

previously been conducted. The observation of the project can create a link between archaeological sites and the landscape and environment that it crosses.

The SCP has already added new information to the archaeological record of the area, and will continue to do so during the course of pre-construction surveys and during the monitoring of pipeline construction. These results will increase the understanding and awareness of the history and development of the territory of Azerbaijan. A further benefit for the area will be the number of people employed on archaeological excavation and research. This will involve not only local people employed in the physical process of excavation, but will also provide opportunities for an increase in skills for specialist staff in recording, documenting and conserving the discoveries along the pipeline route.

Modern cultural resource management practice seeks to preserve archaeological deposits *in situ* and only to excavate as a last resort. Archaeological excavation is a form of destruction in itself, as the only evidence for an excavated site lies in the records kept by the excavator. Preservation of archaeological remains allows future generations an opportunity to examine monuments with more resources and better techniques that should recover more information about past societies.

An archaeological strategy for the project has been created to allow for the progressive assessment and mitigation of the effects of construction of the pipeline. The principle contained in the strategy is that areas of potential impact will be examined and any necessary excavations conducted prior to construction. During construction, other archaeological sites may be identified and these will be archaeologically recorded. The strategy is outlined below and given in more detail in Part 2a, Baseline Appendix.

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

The second phase of the strategy (started in February 2002) has identified areas of highest potential impact; further work is planned during the pre-construction period in these areas to determine the nature and extent of archaeological features. The number of areas to be examined may increase as the programme of survey and assessment progresses and further information is gained about the archaeology of the pipeline route. This increase in knowledge is being carried out by a number of different techniques, and is a gradual process.

The archaeological surveys to date on the various route options of the pipeline have identified over 150 sites within approximately 5km of the route. Of these, approximately 70 locations with archaeological potential have been identified within 100m of the pipeline (see Figure 8-21).

Table 10-16 shows 9 areas that have been identified during the archaeological survey as sites requiring further evaluation during Phase 2 of the archaeological strategy. These 9 areas

comprise 16 of the potential locations identified during the archaeological survey (several 'locations' are close together and are therefore regarded as one 'area'). As the BTC pipeline will be constructed before SCP, these sites will have been evaluated before construction of the SCP begins. However, at some locations additional work may be required as part of the SCP pipeline works to evaluate the sections of ROW (generally a 12m strip) that will not be affected by the BTC pipeline.

An archaeologist with a watching brief will accompany the construction activities on the pipeline, and will record the presence of archaeological features. The archaeologist conducting the watching brief will also advise on procedures to be followed by the construction supervisor.

Table 10-16 Archaeological sites to be evaluated before construction

SITE	DESCRIPTION
Sites 4,5,6 Gobustan KP9-11	The route between two large hills contains three areas with artefact scatters. Trial trenching will be conducted in these areas to determine the nature of any archaeological features present
Sites 21,22 Kazi-Magomed KP54	Nomadic settlement shown by spread of medieval pottery covering a large area. Trial trenching will be conducted in this area
Sites 52, 53, 54 Yevlakh KP221	Medieval settlement is suggested by surface spreads of artefacts. The area however lies in an area of river meanders of the Kura, which may have eroded archaeological features. Trial trenching will be conducted in this area
Site 56 Neymatabad KP236	Very heavy spread of medieval pottery in ploughed fields extending over 500 m along the pipeline route. Trial trenching will be conducted in this area
Site 57 Mingechevir KP248	Surface spread of artefacts along the pipeline route. Trial trenching will be conducted in this area
Site 59 Nadir kand KP276	The pipeline will cross a field adjacent to a settlement mound crossed by the WREP. Pottery from several periods is found over the mound. Although the mound itself will not be affected by the pipeline, there is a strong potential that associated evidence will be impacted. Trial trenching will be conducted in this area
Site 60 Dalmamedli KP280	Extensive Medieval pottery scatter. The pipeline has been re-routed to the west, but the scatter continues in this area. Trial trenching will be conducted in this area
Sites 111, 112, 113 Zaiyamchay KP355	The archaeological surveys have located a previously unknown complex settlement area covering many periods from the Prehistoric to the Medieval. The pipeline route has been moved 200m to the south to avoid the main focus of the site. There is a strong potential for further features to be found on the new route. Trial trenching will be conducted in this area
Site 138 Girag Salakhli KP405	The most prominent feature in the area is the extensive graveyard to the south of the pipeline. On the pipeline route there is a mound that may be a settlement mound and to the east are many pottery fragments of Antique and Medieval origin. Trial trenching will be conducted in this area

If areas of archaeological significance are revealed on the pipeline route, the appropriate response will be decided upon in consultation with the Ministry of Culture and Institute of Archaeology and Ethnography. In some cases it may be possible to alter the route of the pipeline and avoid damage to the feature. Where the pipeline cannot be sensibly moved, significant sites may need to be excavated and recorded prior to construction activities continuing in the area. The additional information that this may add to the archaeology record of Azerbaijan will be a positive benefit.

Through implementation of the archaeological strategy, the negative impact on the archaeological resource of Azerbaijan will be reduced to a minimum and the positive benefits will be maximised to the greatest extent practical. Significant areas where unavoidable impact will occur will be fully recorded, published in academic journals and in a popular form. In this way, the information can be made available for the people of Azerbaijan and other nations.

Overall, it is expected that the benefits of increased knowledge will outweigh any adverse effects on the archaeological resource. The overall significance of residual impacts is therefore classified as **Beneficial**.

10.3.12 Ecology and protected areas

The aspects of the project that have the potential to impact on protected areas and flora and fauna in general are land take (both permanent and temporary), disturbance to the land surface, removal and storage of topsoil, spillages and inadequate disposal of hazardous and non-hazardous waste. In addition, soil compaction will primarily affect flora, while noise emissions will only have the potential to affect fauna.

10.3.12.1 During construction

Ecologists will accompany the construction crews when they are setting out the centreline and clearing vegetation along the ROW. The ecologists will check that routing constraints are adhered to and will participate in any decisions concerning realignment of the route. The ecologists will also undertake a final check for protected species and will organise any additional translocation that is required. If necessary, the contractor will be instructed to suspend work on a section whilst species are moved.

Most of the ecological impacts resulting from pipeline construction will be temporary provided that all disturbed areas are reinstated quickly and effectively after construction in accordance with approved plans. As discussed in Section 5, Project Description, a detailed Reinstatement Specification has been prepared (summarised in Part 4, Technical Appendix) and requires the construction contractor to develop and implement a Reinstatement Plan. The environmental content of this Plan is outlined in Section 14, Management and Monitoring.

A general target of establishing plant cover equivalent to 70% of the original plant density within one year of reinstatement has been set for the SCP project, although in difficult areas a lower target of 50% has been set. It must however be realised that these targets may not be achieved for fragile desert habitats where full recovery of plant communities is expected to take 10-12 years as shown in Table 10-17.

Table 10-17 Habitat natural recovery rates

COMMUNITY	SOIL TYPE	PERCENTAGE RECOVERY TO PRE-PROJECT LEVEL ⁷ AFTER 1 – 12 YEARS											
		1	2	3	4	5	6	7	8	9	10	11	12

⁷ Natural variation in re-vegetation time is implied where the 'Recovery Time in Years' is a range

COMMUNITY	SOIL TYPE	PERCENTAGE RECOVERY TO PRE-PROJECT LEVEL ⁷ AFTER 1 – 12 YEARS											
		1	2	3	4	5	6	7	8	9	10	11	12
<i>Salsola nodulosa</i> + <i>Suaeda dendroides</i> association	Argillaceous saline	0	0	5-10	10-20	20-30	30-40	40-50	50-60	60-70	80-90	90-100	90-100
<i>Artemisia fragrans</i> + <i>Salsola nodulosa</i> association	Argillaceous saline	0	0	5-10	10-20	20-30	30-40	40-50	50-60	60-70	80-90	90-100	90-100
Tamarisk thickets	Relatively moist Argillaceous soil	10-30	30-50	50-55	60-65	65-70	70-75	75-80	80-85	85-90	90-95	95-100	95-100
Marsh/meadow	Argillaceous saline	10-30	30-40	45-55	60-65	65-70	70-75	75-80	80-85	85-90	90-95	95-100	95-100

Source: Dr. V. Hajiyev, Azerbaijan Academy of Sciences.

Protected areas

A number of protected areas or proposed protected areas are located in proximity to the proposed route. The following paragraphs summarise the potential impacts and mitigations for each protected area. It should, however, be recognised that the pipeline has been routed to avoid protected areas wherever possible and only the proposed Gobustan State National Park will actually be crossed, and therefore directly impacted, by the pipeline.

Proposed Gobustan State National Park

In the Gobustan desert a pipeline route has been identified that deviates significantly from the WREP as this shortens the length through sensitive habitats. There will, therefore, be less overall impact to the Gobustan flora and fauna than there would have been had the SCP route run in close proximity to WREP.

However, the extensive nature of the proposed State National Park means that it cannot be avoided completely and 9km of the pipeline route is within the proposed protected area (KP19.5 to 28.5). After consideration of several options for crossing the proposed State National Park, the alignment shown in Figure 4-2 was chosen because it:

- Minimises the length of pipeline within the proposed protected area
- Parallels the WREP, thereby avoiding disturbance of hitherto undisturbed areas
- Avoids active mud volcanoes
- Is feasible in engineering terms (the steep topography and unstable substrates restrict options for crossing the mud volcano ridge)

Within Gobustan, pipeline construction is likely to cause localised degradation of the natural *Artemisia* and *Salsola* habitats and the potential damage to, and loss of, soils. These desert communities are very slow growing and recovery of population levels and community structure is expected to take at least 10-12 years.

Within Gobustan, KP0–29, only the trench line will be stripped of vegetation at the start of construction. Observation of the reinstated WREP indicates that in the desert areas vegetation recovery is at least as good (and in some areas, better) where the plants were left *in situ* compared to areas that were stripped. There are several advantages associated with restricting topsoil removal to the trenchline. This approach will:

- Significantly reduce the quantity of soil that has to be stored and will allow the ROW to be reduced to approximately 20m. This represents a 30% reduction in the disturbed area
- Reduce the risk of erosion as the existing plant cover will help bind the surface together, at least during the early stages of construction
- Reduce the loss of topsoil and the seed bank that is entrained within it.

The Reinstatement Specification requires the construction contractor to develop detailed proposals for restoration of the desert habitats that will be disturbed by construction within the proposed Gobustan State National Park. This will include the prevention of erosion of the soil and reseeded with species from the area. As seeds of the local flora are unlikely to be available commercially it will be necessary to either organise seed collection (under botanical supervision) or to arrange for plants to be cultivated so that their seeds can be harvested.

The residual impact on the Gobustan desert habitat is classified as **High** as it will take over 10 years to reinstate. This impact and proposals for offset mitigation to comply with the World Banks' Natural Habitats policy are discussed further in Section 12, Residual Impacts.

Barda State Forbidden Area

The Barda State Forbidden Area lies approximately 5km downstream of the Kura East East crossing point. Although this protected area could potentially be subject to indirect impacts from construction due to increased sediment load or pollution incidents washed downstream in the river water, this is thought to be an unlikely occurrence as an HDD crossing is proposed for this location.

There is a small risk of a bentonite break out during the HDD operation. If this were to happen, bentonite clay particles could be released into the Kura and add to the sediment load. As the river has a naturally high sediment level and there is a gravel extraction operation immediately downstream from the crossing point, this is unlikely to have significant adverse ecological impacts. The risk of bentonite break out will be addressed during detailed design of the Kura East East crossing and in the Pollution Prevention Management Plan. The residual impact is classified as **Low**.

Karayazi-Akstafa State Forbidden Area

The Karayazi-Akstafa State Forbidden Area is 0.5km upstream from the Kura West crossing point. No project activities are planned within the designated area, so no direct or indirect construction impacts are anticipated.

Lake Jandari

The proposed Lake Jandari Ramsar site is 3km north east of the pipeline route. It is upstream from the pipeline route and is separated from it by a low ridge of hills. No adverse effects on the proposed Ramsar site are therefore anticipated.

Terrestrial flora

The main impact to habitats crossed by the pipeline will be the temporary loss of vegetation on the construction ROW, temporary access roads, pipe dumps and camps. There will also be a small permanent loss of vegetation associated with the AGIs and permanent access roads.

This will have a greater significance in the natural and semi-natural habitats crossed, since these areas are of greater ecological value and are generally more difficult to reinstate than agricultural land. Agricultural land represents the majority of the habitats crossed by the pipeline so specialist reinstatement programmes will be limited in their extent.

Desert and semi-desert flora

The most significant impact will occur where the pipeline crosses the *Artemisia* and *Salsola* deserts of the Gobustan area. This desert habitat is very sensitive to disturbance and takes many years to develop. A detailed Reinstatement Plan and monitoring programme will be implemented to ensure restoration of this habitat, much of which falls within the boundary of the proposed Gobustan State National Park. The mitigation measures for the Gobustan section are addressed under the 'Protected Areas' heading above.

In addition to the specific reinstatement measures that are to be developed for the desert habitats of the proposed Gobustan State National Park and surrounding areas, other standard mitigation measures will be put in place to minimise habitat loss along the pipeline route. These will include ensuring that the working width is generally kept to a maximum of 32m, with reductions considered in sensitive locations (KP1-29) and the prohibition of vehicle movements except on the ROW or assigned access roads.

The Reinstatement Plan will also detail the requirements for other areas of natural and semi-natural desert and semi-desert.

Protected plant species

A translocation programme will protect the populations of *Merendera trigyna* at KP50 and *Iris acutiloba* at KP28 and KP50. The bulbs will be removed and stored elsewhere during the period of construction and then replaced during reinstatement. A monitoring programme will be developed to establish the success of the mitigation. Provided the translocation is successful, there will be **No** residual impact.

Several records of glabrose liquorice (*Glycyrrhiza glabra*) have been noted and it may not be practical to undertake mitigation measures for each recorded location. In this case, the largest affected populations will be determined and specimens will be translocated to a safe area and subsequently replaced once ground profiles have been reinstated. This would reduce the magnitude of loss of this species but will not eliminate it completely. Therefore, the residual impact is anticipated to be **Low to Medium**.

Summary

In conclusion, the residual impact on flora and vegetation of construction activities will vary depending on the naturalness and rarity of the habitats and species which are lost or disturbed. The residual impact for agricultural land will be **Low**, but for the Gobustan desert habitat the significance will be **Medium to High**.

With respect to the permanent habitat loss associated with the AGIs, this has been mitigated by careful site selection following field surveys to ensure that the habitats lost are not of ecological interest and do not support any rare species except for spur-thighed tortoise

(*Testudo graeca*) which has special mitigation (see below). Therefore, the residual impact on permanent habitat loss will be **Low**.

Pollution events due to fuel and/or chemical spills could lead to the smothering and mortality of vegetation and to the contamination of soils which may prevent future regeneration of vegetation. A Pollution Prevention Management Plan and Emergency Response Plan will be prepared and will detail measures for protecting vegetation and soils.

Terrestrial fauna

The main impact on the majority of fauna will be the temporary noise and visual disturbance of construction activities and the potential destruction of breeding sites and young. Construction activities and noise will be regulated as described in Section 5, Project Description, but some temporary disturbance is unavoidable. It is, however, anticipated that all fauna will recolonise or reuse the area of construction once works are completed.

The significance of disturbance depends on a number of factors including the habitat, the species and its ecology, the time of year, amount and duration of the disturbance and the existing levels of disturbance. For instance, large mammals or birds will be more sensitive to disturbance in the remote parts of the Gobustan desert area or other areas further to the west (eg the Shamkir region), than similar mammals and birds will be in highly agricultural areas which are regularly disturbed.

It is likely that large mammals and birds will temporarily move away from the construction area, however there is likely to be some mortality associated with small mammals, reptiles, amphibians and invertebrates that are not able to move away quickly. This is unlikely to cause a significant impact in the majority of cases, since individuals of the same species will recolonise the area once construction is completed. However, the spur-thighed tortoise (*Testudo graeca*) (RDB, Iv) is one such species where loss of individuals could result in a significant impact to the population due to its international rarity.

The periods when fauna will be most affected by disturbance are their breeding season, migratory periods and the main over-wintering season. Construction is planned to take up to 15 months, thereby encompassing all sensitive periods. There are no major terrestrial migration routes crossed by the pipeline and it is likely that migratory birds would move away from the construction area. Therefore no significant impact on migratory animals is expected. The residual impact of loss of breeding sites or habitat and loss of young on fauna due to construction activities will be **Low** to **Medium** depending on the rate of recovery of populations.

The greatest potential impact will be to those animals that are likely to breed along the construction right of way. This includes burrow dwelling spur-thighed tortoise (*Testudo graeca*) (RDB, Iv), water vole (*Arvicola terrestris*) (pRDB) and porcupine (*Hystrix indica*) (pRDB), which lives in burrows in river banks, as well as several ground nesting birds of national and European rarity such as stone curlew (*Burhinus oedicnemus*) (Ev), black francolin (*Francolinus francolinus*) (RDB, Ev) and white tailed plover (*Chettusia leucura*) (RDB). Other species associated with wetlands may also be at risk and include common toad (*Bufo bufo*) (RDB), freshwater terrapin (*Clemmys caspica*) (pRDB) and European pond terrapin (*Emys orbicularis*) (pRDB).

Any disturbance caused by construction activities during the breeding season could lead to the direct destruction and/or the desertion of nests, eggs and dependent young. This could lead to a reduction in breeding success of the species concerned during the construction period, which

would have greatest significance for the species whose populations are already rare or in decline.

Mitigation measures have been developed to ensure that, wherever possible, those species which are of national, European or international significance are not impacted by pipeline construction. A specific mitigation plan is being prepared for spur-thighed tortoise (*Testudo graeca*) (RDB, Iv). Areas likely to support this species will be searched prior to clearance of the right of way; any animals discovered will be removed to a safe distance. Wherever practical, grading activities in these areas will be undertaken outside hibernation periods. Further to this, additional searches will be carried out prior to each main construction activity (eg stringing, trenching and welding) as animals may move into the working area during the course of construction; any tortoises found on or near the site will be moved to a safe distance. Tool box talks will be held to raise the awareness of the contractors about the importance of preserving the spur-thighed tortoise.

At river crossings where evidence of porcupine spp. (*Hystrix indica*) has been recorded, a detailed search for any active burrows will be undertaken by local experts immediately prior to construction. Where active dens are present, minor re-alignments will be considered to ensure that the dens are not destroyed or adversely affected by their proximity to the construction activities. If this is not possible, the animals will be moved to suitable habitat remote from the pipeline works.

If occupied water vole (*Arvicola terrestris*) (pRDB) burrows are found at any of the river crossing locations, the vegetation will be cut back to encourage the animals to move elsewhere. If this is not successful, individuals will be moved to suitable habitat remote from the pipeline works.

Expert ornithologists will survey areas identified as containing suitable habitat for ground nesting birds such as stone curlew (*Burhinus oedicnemus*) (Ev) at KP12–14 or black francolin (*Francolinus francolinus*) (RDB, Ev) at KP106 during the peak breeding season (late March to mid-June) in 2002. If ground nesting birds are found to be present, a protocol for mitigating the impacts of construction will be developed. This will include options for discouraging birds from nesting on the ROW. Clearance of the ROW, particularly in more vegetated areas, may present a temporary barrier to movement for some fauna such as small mammals, amphibians and reptiles. In addition, animals may fall into the open trench and die if they cannot escape. This is not likely to cause a significant effect on the population of any species but to minimise the risk, not more than 15km of trench will be open at once in any section. In order to allow animals to escape from the open trench, planks (or another type of walkway) will be placed in the trench at intervals. The residual impact will be **Low**.

Waste foodstuffs can encourage vermin if not adequately managed. The Waste Management Plan will include procedures for the disposal of food and other organic wastes. The vermin population will be monitored and controlled so that it does not become a nuisance or disease risk.

Aquatic species

Within watercourses, impacts on fish are most significant during the migrating and spawning periods (October to June) and could be caused by fish passage restrictions, sediment-laden run-off from the working width and river bed sediments that become suspended during trenching activities. This could affect the survival of fish eggs in gravel beds or spawning grounds as a result of de-oxygenation caused by silt deposition. The survival of fish and

aquatic invertebrates may also be affected as a result of gill damage from sediment particles and through water de-oxygenation.

The Rivers Kura and Hasansu contain spawning grounds. In order to minimize impacts:

- The Kura East crossing will be constructed by HDD. As discussed above (protected areas) this minimises the risk of sediment release during construction, although there is a small risk of bentonite break-out.
- A non-open cut technique for the Kura West and Hasansu crossings is precluded by ground conditions. These two rivers will therefore be open-cut outside the spawning season. In Azerbaijan this means restricting construction to a window between late June and early October.

Adopting the sediment reduction measures described in the Reinstatement Plan will further reduce impacts on fish and other aquatic life. These include the use of sediment traps to reduce the input of construction-derived sediments into the river systems. The residual impact on fauna in watercourses will be **Low**. Where construction is to be carried out by HDD, no seasonal constraint will be imposed upon pipeline construction.

Where construction across watercourses is by an open cut technique, it will take place as quickly as possible to minimise the impact to the aquatic environment. It will however normally be necessary to retain vehicle access across most of the watercourses until that section is reinstated. The Reinstatement Plan will consider reinstatement techniques for each watercourse and will take account of the river corridor survey results; the chosen methodology will vary according to the ecological significance of the channel and banks. Where practical watercourse banks will be re-profiled to their pre-existing form using original bank material, stored separately on the ROW. Where erosion protection measures are necessary to ensure long term stability, the design will take account of ecological considerations and will seek to provide minimal changes to the bed or bank substrates and profiles.

Pollution events due to fuel and /or chemical spills may lead to the smothering and mortality of some faunal species, such as invertebrates, or fish, amphibians and aquatic reptiles if the spill is into or near a watercourse. Contamination of fauna by spills or leaks will be minimised by compliance with the Pollution Prevention Plan as described in Section 10.3.8 (Hydrology). These will include restrictions on refuelling within 30m of a watercourse and will detail spill containment and cleanup procedures.

Temporary disruption of vegetation corridors along rivers and their banks may result in the temporary fragmentation of these habitats causing disruption to wildlife corridors and the movement of fauna. To minimise disruption, riverbank vegetation will be reinstated as quickly as possible. All watercourses, and 25m either side of them, will typically be fully reinstated once the SCP has been installed; interim measures will not usually be employed. This will allow the earliest recovery of the riverine ecosystem.

10.3.12.2 During operation

Once the pipeline is operational, it is not anticipated that routine activities will result in any significant impacts on the ecology and protected areas along the route. Occasionally there may be localised disturbance from the pipeline inspection team, but this will be of negligible significance. The residual impact is classified as **Low**.

Occasional noisy operations related to maintenance of the pipeline system will generally be restricted to the immediate vicinity of the AGIs. No significant effects on wildlife are anticipated.

The potential impacts that would result from the release of natural gas following a rupture during operation of the pipeline are addressed in Section 10.4, Unplanned events.

10.3.13 Traffic and transportation

The volumes of traffic generated during construction of the pipeline and associated facilities far exceed those that will be required for the operational phase of the pipeline, where traffic impacts will be negligible. Temporary impacts during construction are likely to be considerable if not adequately managed, and are discussed in detail below.

10.3.13.1 Operation of the existing road network

The volumes of traffic generated during the execution phase of the project, although large, will cause only a minor operational impact on the existing road network. Whilst on some roads the volumes will represent more than a doubling of existing traffic flows, the volumes are sufficiently low for this not to be a concern. No locations have been identified where the additional volumes will create delays, queues, or disadvantage to other road users.

However, there are a number of potential problems associated with the increased level of heavy goods vehicles on the roads:

- Conflict with slow road users on most of the access roads where the road is too narrow to allow convenient passing
- Physical constraints in urban areas
- Anti-social aspects of goods vehicles near sensitive receptors
- Accidental events

Each of these items is discussed in detail below, followed by a section on mitigation for these potential impacts.

10.3.13.2 Conflict with pedestrians and livestock

Slow road users will be disadvantaged in a number of ways by the general increased level of traffic along the roads being used. The vast majority of slow road users in Azerbaijan are pedestrian. The most significant potential impact for pedestrians is in terms of safety. In many cases pedestrian activity is a significant proportion of the total level of traffic on the road. As such, conflicts with large construction vehicles are possible and any incidents will probably be of a serious nature.

Sensitive receptors such as hospitals, schools, shops, markets and major employment centres may be affected by increased traffic, as would slow road users such as horse/donkey drawn carts. Schools are of particular concern as young children often have not developed an appropriate level of traffic and road awareness and so are at greater risk.

On the majority of roads along the route, the movement of animal flocks is significant. Such movements often take up the whole road for a period of time. Therefore, it is likely that interaction with animal flocks will occur.

10.3.13.3 Physical constraints in urban areas

The size and weight of the vehicles used to transport the pipe and other materials will be substantial, particularly in comparison to the other road users and given the size and state of repair of the roads. This will be particularly noticeable in towns and villages, where there are physical constraints such as buildings, tight corners and numerous street vendors with small stalls. However, in the more rural areas such vehicles are less likely to cause problems as traffic density is generally lower and the roads are more open.

Field observations during the traffic surveys indicate that there are likely to be few restrictions in terms of vertical constraints (ie the presence of overhead features). Access problems are therefore most likely to result at junctions where the vehicles are required to make a turn.

In urban areas, shops and stalls are often sited immediately along the side of the road. Such activities create pinch points either directly or through vehicle parking in close proximity.

The volume of parking and pedestrian use on roads in villages and urban areas, particularly where street vendor stalls are located, reduces the effective operating width of the carriageway and may mean that larger vehicles cannot safely negotiate a section of the road.

10.3.13.4 Anti-social aspects of goods vehicles near sensitive receptors

Anti-social aspects of construction vehicles are considered to be noise, vibration and emissions. Issues in this regard will be related to both time and location. Noise and vibration caused by heavy vehicles could affect considerable numbers of local residents in urban areas, particularly in areas where sensitive receptors such as schools and hospitals are located. They will also affect roadside pedestrians and street vendors, particularly during busy market days.

10.3.13.5 Accidental events

Impacts may be experienced as a result of accidental actions. With a considerable volume of vehicles being used, some following circuitous routes, there is the potential for vehicles to follow the wrong routes. This could lead to a wide range of issues including:

- Bridge strikes and grounding
- Bogging down on roads unprepared for the loads
- Damage to pavements
- Damage to other infrastructure
- Accidents involving injury

The behaviour of other road users, such as erratically driven cars (including Ladas heavily laden with fruit and vegetables) and mini buses may cause pipe trucks to swerve to avoid an accident. This could lead to damage to other infrastructure such as pavements and street stalls or injury to people.

10.3.13.6 Mitigation

The main mechanism through which potential traffic impacts will be managed is through development and adherence to a Transport Management Plan. The following mitigation measures will be included in the Transport Management Plan, and are outlined in more detail in Section 14, Management and Monitoring:

- Identifying optimum routes from pipe storage areas to the ROW to avoid sensitive receptors such as schools and hospitals, wherever possible
- Identifying weight/height restrictions and alternative routes
- A sign posting strategy for the routes
- Enforcement of maximum speeds at which vehicles are permitted to travel
- Restrictions on hours of driving (including night time restrictions where sensitive receptors may be affected)
- Timing of vehicle movements to avoid busy periods in urban areas, particularly the start and end of school and the working day
- Driver training, assessment and monitoring
- Journey management planning
- Control over routes used by vehicles to avoid construction traffic using inappropriate roads and other road users gaining access to the pipeline spread and access roads
- Development of procedures to follow when herds are blocking the road and educating drivers to reduce speed in this situation
- Development of guidelines to avoid excessive noise, vibration and nuisance in populated areas
- Ensuring adequate vehicle maintenance to ensure that vehicles do not produce significant emissions and that all safety features including brakes, lights etc are in good condition

Following implementation of the Transport Management Plan, it is anticipated that the Residual Impact due to increased traffic movements will be generally **Low** on the open Baku-Tbilisi Highway and rural roads. However in some villages and towns there is likely to be a **Medium** residual impact. This is discussed further in Section 12, Residual Impacts.

10.4 ASSESSMENT OF UNPLANNED EVENTS

10.4.1 Introduction

Historically, pipelines have been found to be a safe mode of transportation of hazardous fluids when compared with other modes of transportation, as demonstrated in Table 10-18. Whilst these statistics are for hazardous liquids pipelines, the pattern can be applied to other potentially hazardous substances such as gas. The considerable operating experience of pipelines over the years is continuing to drive these risks even lower.

This section describes the potential risks to public safety and the environment presented by the proposed SCP pipeline due to unplanned events. The main issue of concern from an unplanned event or accident affecting the SCP is a failure of the pipeline resulting in a gas release. Therefore, a quantified risk assessment has been undertaken to assess the risk of SCP pipeline failure to people (Section 10.4.2). A qualitative assessment of risks to the environment is provided in Section 10.4.3.

**Table 10-18 Relative safety of modes of transporting hazardous liquids 1982-1985 USA
(Transportation Research Board 1988)**

MODE OF TRANSPORT	AVERAGE ANNUAL FATALITIES	AVERAGE ANNUAL INJURIES	EXPOSURE (AVERAGE BILLION TON	AVERAGE ANNUAL CASUALTY RATE
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			MILES BTM TRANSPORTED)	(CASUALTIES* PER BTM)
Rail tank cars	0	49.8	12.3	4.048
Water tankers	0	<1.0	602.1	<0.002
Highway (Road) tankers	5	36.5	26.4	1.572
Liquids Pipelines	3	16.5	563.6	0.035

* Note – “casualties” is the total of fatalities and injuries

10.4.2 Safety risk assessment

The main focus of risk assessment for a gas pipeline is the estimation of risk to the public, unlike that for an oil pipeline where it is environmental impact. However, the information developed for the safety risks, such as the likelihood and magnitude of an accidental event, can be used directly for the assessment of environmental risk also, and these are discussed at the end of this section.

The complementary processes of following codes and standards in conjunction with risk management to provide assurance of public safety and environmental protection are described further in the following sections.

Risk is frequently expressed as:

$$\text{Risk} = \text{likelihood of occurrence} \times \text{magnitude of consequences.}$$

Risk can therefore be lowered by reducing either the likelihood of occurrence, or the severity of the consequences. The most effective way to reduce risk is by preventing the initial failure occurring. This applies equally to safety and environmental impacts. It is particularly true in the case of public safety because, in the event of a major release from either a large hole or pipeline rupture, the gas in a section can be released in a short time. It is, in general, only the major releases from large holes or ruptures that may affect population at any distance from the pipeline.

The principal focus to reduce risk in the case of a gas pipeline is to reduce the potential for a major accident to occur. The good performance of pipelines historically has been achieved through the industry’s development of comprehensive, internationally recognised codes and standards based on good engineering practice and operational experience.

In addition to following the requirements of codes and standards, the industry has increasingly augmented its approach to pipeline safety through the application of hazard and risk management principles; this project is no exception. Hazard and risk management has been applied from the start of the design process, and will be revisited during the lifecycle of the pipeline. This approach is based on the following main principles:

1. Preventing a release from occurring through design (this is often termed the “inherently safe” approach)
2. Identifying any parts of the route that may present particular location specific hazards (eg due to seismic or other geohazards, road, rail and river crossings, etc) and incorporating these factors appropriately into the design
3. Designing the route of the pipeline so that people and sensitive areas are located away from the pipeline, and are not affected by the consequences in the event of a release.

- Where this is not possible for practical reasons, (eg difficult terrain), then re-evaluating the steps taken in 1 above, and introducing additional measures, as necessary
4. Once the pipeline is operational, ensuring that risks are further minimised by appropriate management measures including:
 - Operating within the intended design conditions
 - Regular inspection and maintenance
 - Regular patrolling of the line to detect any agricultural, construction, or other external activities in the vicinity of the pipeline
 - Ensuring that there is no future encroachment of population close to the line in the form of new residential developments

The Hazard and Risk Management approach has sought to demonstrate the principle of “ALARP” for the safety risks ie that risks are “*As Low As Reasonably Practicable*”. Although this concept was originally developed in the UK, it is now widely applied internationally to determine the safety acceptability of major projects and developments. It recognises that there is an upper limit of risk of serious injury or fatality that the general public can be expected to tolerate. There is also a lower limit that is broadly acceptable, when compared with the risks of everyday life. In between these upper and lower limits there is a tolerable area where the risks should be reduced further provided that it is reasonably practicable to do so.

Whilst the emphasis is on the prevention of accidental events, it is recognised that there is a very small probability that a release may occur. Therefore, appropriate risk mitigation measures will be put in place, including a comprehensive emergency response and contingency plan (see Section 10.4.4 at end of this section). The aim of the emergency response measures would be to respond to an accidental release of gas, should one occur, in a prompt and effective manner so as to minimize its consequences.

10.4.2.1 Basis of design - codes and standards

The SCP pipeline system will be designed, fabricated, constructed, tested and commissioned in accordance with the requirements of ASME B31.8 “*Gas Transmission and Distribution Pipeline Systems*” and supplemented by ASME B31.3 for the AGIs. Both ASME B31.8 and B31.3 reference various Codes and Standards and the latest revision of these will be used.

The following key material properties and design data have been developed in the design for the SCP pipeline are shown in Table 10-19.

Table 10-19 SCP key design data

PROPERTY	DATA
Pipeline Outside Diameter	42” (1067 mm)
Design Life	30 years
Design Pressure	95.5 barg
Linepipe	Submerged Arc Welded API 5L Grade X70
Specified Minimum Yield Strength	482 MPa
Wall thickness (See below for explanation of class/wall thickness requirements)	14.7mm (Class 1) 17.7mm (Class 2) 21.2mm (Class 3)

ASME B31.8 is one of the most long established standards in use internationally. Its approach to public safety is based on the use of different classes of pipe or “design factors” depending

on the population density of land use in the vicinity. These classes are summarised in Table 10-20.

The “Design Factor” referred to above is the ratio between the actual operating stress of the pipeline and the yield stress of the material (ie it is an indicator of how much margin there is between the stress caused by normal operating conditions and how much the pipeline could endure before it started to deform permanently).

A lower Design Factor may be achieved in two ways: either by the use of greater wall thickness or by the use of higher strength steels. Where a greater wall thickness is used to achieve the desired affect, this has the added advantage of providing better protection against mechanical impacts (eg from excavating and agricultural machinery), which are historically the biggest cause of major pipeline failures.

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Table 10-20 ASME B31.8 class/location requirements

DESIGN LOCATION CLASS	DESCRIPTION	NO OF DWELLINGS	DESIGN FACTOR
1(Division 1)	Sparsely populated areas, wasteland, desert, mountain, grazing and farmland.	Less than 10	Greater than 0.72 but equal to or less than .0.8
1 (Division 2)	Sparsely populated areas, wasteland, desert, mountain, grazing and farm land	Less than 10	Equal to or less than 0.72
2	Fringe areas around cities and towns, industrial areas, ranch or country estates.	Greater than 10 and less than 46	0.6
3	Suburban Housing developments, shopping centres, residential areas, industrial areas and other populated areas not meeting Class 4.	Greater than 46	0.5
4	Any area where multi-storey buildings (4 or more floors) are prevalent and where traffic is heavy or dense and where there may be numerous other	Any Number	0.4

DESIGN LOCATION CLASS	DESCRIPTION	NO OF DWELLINGS	DESIGN FACTOR
	underground utilities.		

Notes: In multi-storey units, each dwelling within the unit is considered as an independent dwelling.
Pipelines in Class 1 or 2 passing near places of public assembly or concentrations such as schools, hospitals or recreational areas of an organized nature, including outside areas that are frequently used shall meet the requirements of Location Class 3.

The requirements of ASME B31.8, therefore, address implicitly, the key public risk issues of gas pipelines that are important in the design and routing process:

- Reduction of pipeline ruptures in populated regions (as it is only the largest releases that have the ability to reach population at any distance) through the use of lower Design Factors
- For the same steel strength, also increasing the impact resistance of pipelines in populated regions. This recognises the increased likelihood of outside force damage due to the greater population

The SCP pipeline has adhered to the above requirements as its base case in determining the routing and class requirements. Wherever possible the principle of avoidance of population or sensitive areas has been applied. Where the pipeline encroaches on areas of limited population, the class requirements of ASME B31.8 have been followed by increasing the wall thickness. In certain areas the design has gone beyond the strict requirements of the code as a result of applying a conservative engineering approach. This has resulted in, for example, deeper burial or other impact protection in certain locations.

Other national codes and standards follow similar principles to those in ASME B31.8 in that they define different Design Factors for different locations relating to population density, ranging from 0.3 to 0.80.

The British Standard BS 8010 (British Standards, 1992) gives graphs of allowable distances from the nearest buildings for methane pipelines. These vary by diameter, design factor and whether the wall thickness at the lower design factor is greater than 11.91mm. The wall thickness benefit is directly related to full-scale experimental work carried out by British Gas on the impact resistance of pipes to different types of excavating machinery. These experiments found that only 5% of excavator types then available had the capacity to penetrate pipe with a wall thickness above 11.91mm and none had the capacity to create a hole of 80mm diameter or greater (Jones and Carter 1990). The SCP's wall thickness is always above 11.91mm and therefore it can be seen that it is inherently resistant to major mechanical impact damage along its whole length, in all location class areas.

The standard, however, allows variation from these distances if a risk assessment can demonstrate it is justifiable due to the implementation of other risk reduction measures. Other national standards have also included a risk basis in recent years. In the US, the Office of Pipeline Safety has been piloting a risk demonstration programme for onshore pipelines whereby the requirements of ASME B31.8 and other pipeline codes, may be varied if it can be shown that a risk based approach can deliver a better standard of safety than the code's requirements. (See the US Office of Pipeline Safety – OPS - website for summaries of initiatives and their Report to Congress in 2001).

The use of risk assessment to enhance the prescriptive requirements of codes, leads to overall better management and risk reduction, and is well established international practice.

10.4.2.2 Risk assessment methodology

The following documents were used as the methodological basis for the risk assessment:

- John Brown Hydrocarbons “*Pipeline Quantified Risk Assessment*”, document No. 410088/00/L/SA/RP/004
- John Brown Hydrocarbons “*Pipeline Risk Assessment Methodology*”, Document No. 410088/00/L/SA/PH/011

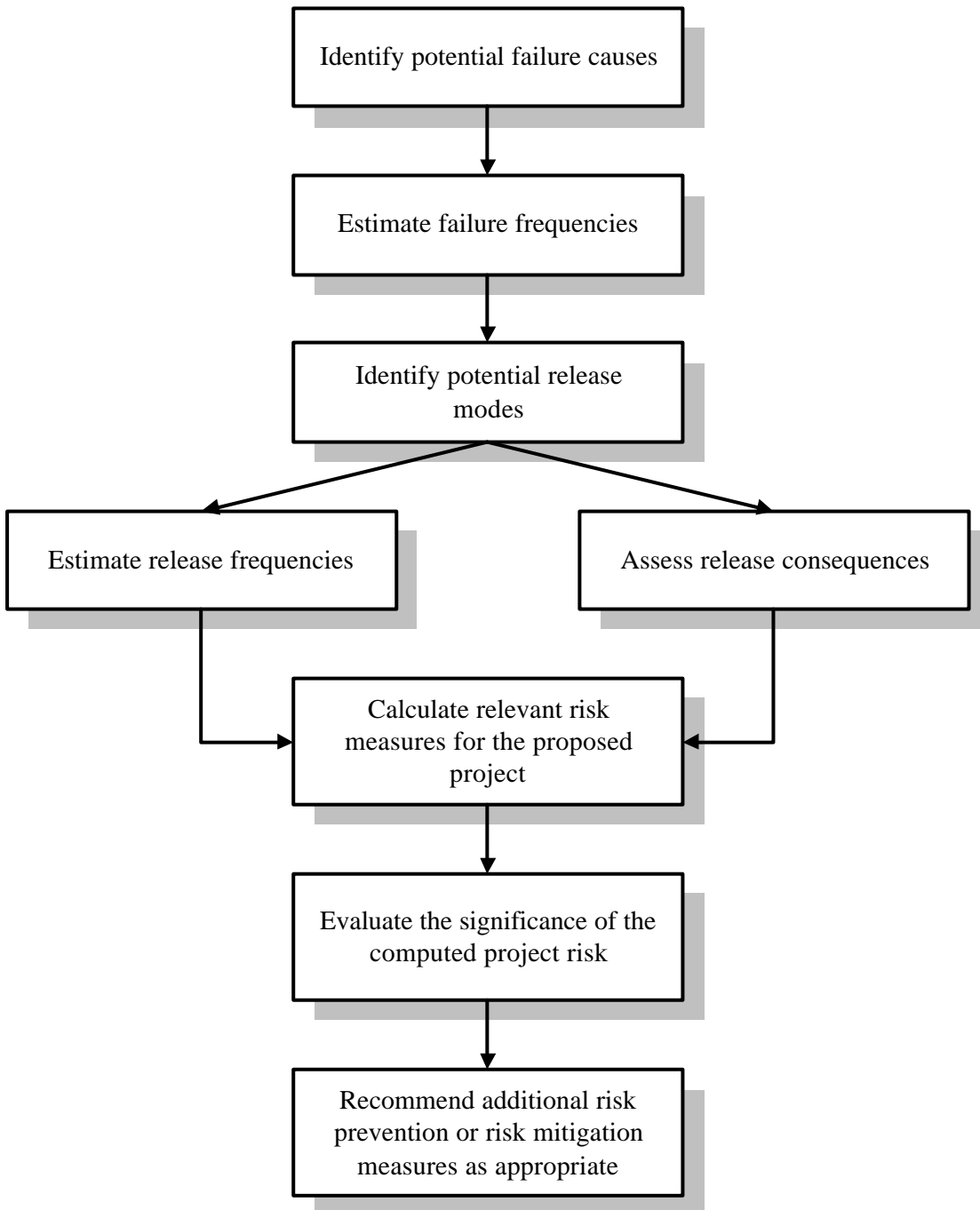
Both these documents draw extensively on other published sources (including, for example Morgan and Hill, 1997; Morgan, 1995; Morgan, 1989; Corder, 1995; Hill and Catmur, 1995; and Carter, 1991).

Note that this section concentrates on the risks associated with the pipeline itself and not with valve stations or other above ground installations (AGIs). This is because this section is concerned with public risk. There is a very small increased risk to the public at valve stations *but only if they were in the immediate proximity, which routing has ensured that they are not*. This is due to the potential for some additional, but very small releases, from valve fittings that do not extend to any significant distance.

It is important to recognise the value of risk assessment not only as a design tool, but also for the lifetime safe operation of the pipeline. Risk assessment is used to prioritise operational effort to reduce the likelihood of leakage according to the highest potential risk and to allow appropriate emergency planning. It is also used to assist decision-making on future land-use in the vicinity of the pipeline on the basis of pipeline safety.

The main steps in the risk assessment process are shown in Figure 10-2.

Figure 10-2 Risk assessment methodology



Identify potential failure causes

The objective of this step is to identify potential failure causes for a natural gas transmission pipeline system. Historical accident data on gas transmission pipelines suggest the following main failure causes:

- Construction or material defect
- Corrosion
- Hot tap (ie breaking into a “live” pipeline for maintenance or other operations reasons or operational error)
- External interference
- Ground movement or natural hazard

Estimate failure frequencies

The objective of this step is to estimate the frequency of system failure for each failure cause. Historical accident data on gas transmission pipelines are used to estimate the generic failure frequencies. These frequencies are then adjusted for the specific features of the proposed system.

For the SCP pipeline, failure frequencies have been based mainly on those collated and reported by EGIG (European Gas Pipeline Incident Data Group – see their web site for reports on incidents and statistical information). These have been compared with other sources of data such as for US Department of Transport (DoT) for gas transmission pipelines, and the UK Onshore Pipeline Operators Association (UKOPA) to ensure that a cautious best estimate of the pipeline frequencies has been used.

The UKOPA data demonstrate much lower frequencies of failure, especially of rupture, than EGIG, which reflects the “younger” pipeline population in the UK and the positive effect of modern design codes. It could, therefore, be argued that these would be more appropriate to the SCP than the older EGIG and US data. However, EGIG data have been conservatively adopted for the base case generic frequencies because it is a much larger data source and covers a wider range of terrain and other conditions that may be relevant to the SCP.

Identify potential release modes

The objective of this step is to identify the potential modes in which gas may be released into the atmosphere given a system failure. The release modes may be characterised in terms of the hole size caused by the failure. Small holes would be leaks with relatively low gas release rates and limited consequence distance. At the other end of the spectrum would be a full-bore rupture with a high release rate and the ability to disperse some distance.

Estimate release frequencies

The objective of this step is to estimate the frequency of release in each mode. This step combines the failure frequencies from Step 2 with the hole size distribution given a failure due to a specified cause. Again, historical failure data have been used to estimate generic release frequencies and project-specific data used to adjust these frequencies as appropriate. This has included taking account of the reduction in major rupture frequencies justifiable from impact for the wall thickness, deeper burial, and lower design factors. However, it has also included increased failure frequencies in regions prone to geohazards. In the latter case, none of these are coincident with nearby populations so that there are no concerns on populations.

Assess release consequences

The objective of this step is to assess the severity of consequences of a release in each mode. The consequences of the different kinds of release have been calculated using established, industry-recognised software models. In considering the effects of a release the different possible scenarios have been considered, such as whether a release is ignited immediately or after some delay.

Calculate relevant risk measures for the proposed project (to the public)

The objective of this step is to estimate the risk of the proposed SCP to the public living in the vicinity. For the SCP, a conservative approach was taken to estimating the risk of a serious injury or fatality. This was done by assuming a base case of a hypothetical individual being present at a given location 24 hours per day 365 days per year per year; this is obviously an unrealistic assumption but provides in-built conservatism to the calculation. This risk is expressed as the individual risk of fatality per year at a given distance from the pipeline. The actual risk to a real person is much less than this as no individual stays in the same location permanently. It is a frequently used comparative tool for pipeline risk assessment.

This risk calculation includes the previous steps discussed above and also considers such factors as: the likelihood of an ignition; and whether the majority of releases will disperse into the atmosphere harmlessly without being ignited.

Evaluate the significance of the computed project risk

This step evaluates the significance of the estimated risk in light of well-established and published criteria of acceptable risk for communities (see for example UK HSE 2001), and common oil and gas industry practice for western international operators. These upper limits of tolerability to the public in terms of individual risk of fatality are generally set at 10^{-4} to 10^{-5} /year, (equivalent to between one chance in 10,000 and one chance in 100,000 of a fatality per year). Risks are considered broadly acceptable when below approximately 10^{-6} to 10^{-7} /year, (one in 1,000,000 to one in 10,000,000 chances of being a fatality per year). The more conservative risk limits are usually applied to vulnerable populations such as schools, hospitals, large populations out of doors, etc.

These tolerable risk levels have been derived from statistics for risks that people experience in everyday life. For example, in the UK published statistics (HSE, 2001) quotes a chance of death from road accidents of about one in 17,000 per year or about 60 chances per million per year, which is a similar chance to that of being killed in the construction, agricultural or forestry industries.

Recommend additional risk prevention or risk mitigation measures as appropriate (and recalculate risks)

The objective of this step is to assess the benefits of additional risk prevention or risk mitigation measures if the estimated risks exceed acceptability criteria and, thereby, to ensure that risks are reduced to ALARP. The risks are then re-calculated as required.

10.4.2.3 Safety risk results and discussion

Risk transects have been calculated for the locations with the three different classes according to ASME B31.8 and, therefore, the three different Design Factors, and give the following key conclusions:

- The risk to an individual if they were present at all times never exceeds 10^{-5} /year;
- In Class 1 locations (ie unpopulated or very sparsely populated regions), the maximum risk to an individual if they were present at all times never exceeds 2×10^{-6} /year;
- In Class 2 and 3 locations, the maximum risk to an individual if they were present at all times never exceeds 1×10^{-6} /year;
- In Class 3 locations, the risk to an individual if they were present at all times never exceeds 5×10^{-7} /year, and drops rapidly at a short distance from the pipeline.

It is apparent that when compared with the risk criteria presented in Step 7 above, the risks presented by the SCP are extremely low, even when assuming a permanent presence.

10.4.3 Environmental risks and discussion

The potential environmental risks associated with gas releases to the environment are relatively limited, being restricted those shown in Table 10-21.

10.4.3.1 Risk of fires

The SCP route in Azerbaijan does not pass through any forest areas so the fire risk is much lower than in Georgia. In the event of a release, it is likely that any nearby scrub or grassland would catch fire and that flames may travel some distance down wind from the site of the incident. This would cause short-term damage to plants and possibly housing, but would be comparable to naturally occurring fires started by lightning strikes.

10.4.3.2 Impacts to aquatic populations at river crossings

In Azerbaijan, the SCP route includes two major river crossing (Kura West and East) and nineteen other river crossings that have been identified as environmentally sensitive as they either provide water and irrigation to local communities and are upstream of ecologically sensitive sites.

A pipeline failure at, or close to, a river crossing could release gas into the water. Methane would be dissolved and may create a locally toxic environment that impacts the fish and other aquatic population in the river or stream. The severity of impact would depend on many factors, such as stream flow conditions and season. A large-scale mortality of the fish population is unlikely to occur just from methane contamination and any impact is likely to be short-term. Another potential hazard is a fire over water that would cause temperature changes and the removal of oxygen from water. The impact could kill fish that are sensitive to water temperature (such as salmon). The probability of such a scenario is low and the range of the impact - should it occur - would be small.

The impact to drinking water is likely to be minimal, because of the dilution and volatilisation effects. The impact to any drinking water and irrigation water is likely to be minimal and short-term.

Table 10-21 Environmental aspects and impacts associated with a major gas release

ASPECT	POTENTIAL IMPACTS
Cratering and associated release of projectiles	Loss of soil resources (temporary) Modified drainage Loss of habitat Loss and injury of fauna Overpressure Noise
Release of unignited methane to atmosphere or into a water body	Contribution to global warming (minor) Loss of fauna resulting from asphyxiation Toxicity to aquatic species Noise
Fire – ignition of released methane and consequential burning of vegetation	Loss of habitat Loss of fauna Release of combustion products (principally carbon dioxide and water) causing degradation of local air quality (short term)

10.4.3.3 Impacts of minor leaks on local crops and sensitive areas

275km of the pipeline route crosses agricultural areas as shown in Table 10-22.

Table 10-22 Environmental aspects and impacts associated with a major gas release

HABITAT TYPE	LENGTH (km)	% OF TOTAL LENGTH
Desert	110.15	24.9
Semi-desert	35.50	8.0
Woodland and scrub	4.30	1.0
Wetland	16.25	3.7
Agricultural	275.00	62.2
Other (quarries, refugee camps, etc)	0.80	0.2
TOTAL	442.00	100

The pipeline route also crosses or passes close to several sensitive habitats identified in the baseline environmental surveys (see Section 8, Environmental Baseline).

In case of a major pipeline failure, greater impacts to farming areas, wetlands and other sensitive habitats could occur if the failure results in a large-scale fire. The probability of such a failure scenario, however, is extremely small.

Another concern is the impact of minor leaks that would go undetected over extended periods of time. With enhanced leak detection system planned for this project, only very small leaks would go undetected. Any gas escaping from such a small leak would simply disperse into the air without causing any significant impact to local crops or habitats. If there is any impact to small, localised areas this may be detected during the routine surveillance of the pipeline route. A significant, long-term impact from minor leaks is unlikely.

10.4.3.4 Other accidental releases

Whilst loss of containment of the gas pipeline would have the most significant consequences, there are other potential unplanned events that may occur during construction and operation of the pipeline.

The most likely are spillages of fuels and lubricants from storage tanks, bowsers and when refuelling mobile plant. These hazards will be managed by:

- Implementing and auditing procedures in the Pollution Prevention Plan
- Siting fuel stores and refuelling points away from watercourses and drains
- Using bunded tanks
- Developing a Spill Response Plan for containing and cleaning up any spills and for providing people, equipment and materials
- Training of operators
- Auditing of operations

Any losses of containment from refuelling and lubrication will typically be small scale, short term, localised and reversible.

10.4.4 Summary and recommendations

The following mitigation measures will minimize the likelihood of an unplanned event:

- **Design - routing:** by avoiding populated areas, geohazards (unstable river crossings, unstable slopes, poor ground conditions, mined areas, steep slopes, etc) and environmentally sensitive areas
- **Design - materials and dimensions:** by incorporating adequate safety factors, using internationally recognised design codes and standards, incorporating designs to allow for seismic / faulting impacts (1 in 500 year event), using block valves, incorporating suitable grade of steel and wall thickness, using thick wall pipe and sleeves, burying and slabbing the pipe adequately at river crossings, coating the pipe to prevent corrosion and by controlling and inspecting materials and fittings at the mill and during transport and storage
- **Construction:** by managing construction operations, using special methods (such as horizontal directional drilling), by inspecting all welds (radiographically and/or ultrasonically), coating and wrapping the pipe, by careful backfilling, by implementing and auditing the Environmental Management Plan and by providing “as built” drawings and records
- **Testing and commissioning:** by hydrostatic testing and intelligent pigging
- **Operation and maintenance:** by controlling operating pressures within design criteria, cathodic protection, leak detection system, line walking and inspection and intelligent pigging
- **Decommissioning and abandonment:** by purging, grouting or removal.

Block valves will be positioned at intervals along the pipeline (see Section 5) to facilitate shut down of gas flow in an emergency. This will limit the quantity of gas that will be released to the atmosphere.

Appropriate operational management measures should also be implemented throughout the lifetime of the pipeline to ensure that the pipeline integrity is maintained. These measures include:

- Leak detection system
- Inspection for signs of corrosion
- Regular patrolling of the route and liaison with local communities to ensure that the pipeline is not damaged due to agricultural or other excavation work close to the line

Appropriate separation distances between the pipeline and its various ancillary systems and other pipelines (particularly the WREP and BTC pipelines) and from centres of population will be maintained during the operational life of the pipeline, based on risk assessment principles.

In the unlikely case that a gas release event occurs, the Emergency Response Plan will be activated that will address:

- Inspection for signs of corrosion
- Environmental mapping of habitats vulnerable to potential natural gas leaks or emissions in the entire SCP System
- Situational scenarios of potential leaks, emissions, explosions, fires and responses, taking into consideration local circumstances
- Plans for the provision of relevant emergency response equipment, materials and services
- Plans for the deployment of relevant equipment and emergency response notification details of the organisation required to handle natural gas leaks, emissions, explosions and fires
- Plans for the evacuation and care for injured persons and the remediation, restoration of or compensation for damaged property, and the treatment and disposal of any resulting contaminated materials

Any unplanned release of gas will not have any significant adverse environmental effect in the medium to long term (after one to five years).

SOCIAL IMPACTS AND MITIGATION

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11 SOCIAL IMPACTS AND MITIGATION

11.1 INTRODUCTION

This Chapter sets out the potential socio-economic impacts of the SCP project and describes the management and mitigation measures to address these impacts. It specifically addresses the impacts of the project on pipeline affected communities¹ at each stage of the project². It also briefly describes any residual impacts on these communities after implementation of the measures. Section 12 considers residual impacts in further detail.

11.1.1 Project specific issues and impacts

Five categories of issues related to project activities have been identified as a result of the field survey work and wider consultation. These are as follows:

- Local employment and procurement opportunities (Section 11.3)
- Land acquisition and land-based livelihoods (Section 11.4)
- Local infrastructure, services and natural resources (Section 11.5)
- Community relations, management of construction workers and camps (Section 11.6)
- Safety and nuisance (Section 11.7)

11.1.2 Non project issues

An additional indirect issue, (i.e. an issue not a result of the project itself, but nonetheless a concern related to the project), access to energy, was identified and is discussed separately in Section 11.2 below.

11.1.3 Assessing Impacts

The evaluation of socio-economic impacts is not an exact science and always requires a considerable degree of subjective professional judgement, based on in-country and previous project experience. This is primarily because data on potential socio-economic impacts consists not only of fact but also of individual and community perceptions and attitudes often meaning that the impact will vary according to the individuals or communities involved. The data that have been collected provide evidence and support for this evaluation, but do not allow impacts to be fully quantified or their importance to be assessed or ranked numerically. A general categorisation of the significance of the residual impact is however provided and is based on professional judgement of the likelihood and consequence of the impact. (See Section 7, ESIA Methodology, for an explanation of this categorisation).

¹Pipeline affected communities are defined as those that are located within (or partly encroach into) a 2km corridor either side of the route, are within 5 km of a potential construction camp or pipe yard, or are within 100m of an access road. A summary of the known pipeline affected communities can be found in the Baseline Appendix.

² There are a number of other social and socio-economic issues that are regional in nature as opposed to route specific. These are being examined within the scope of another study entitled 'Economic and Social Implications of ACG/BTC (and Shah Deniz) in the Regional and National Context'. This regional study addresses broader issues of interest, including revenue management, access to energy, economic linkages, conflict and human rights. One issue covered in this review that may be of particular interest to readers of the ESIA is the project's approach to pipeline security. The BTC security arrangements are described in Chapter 5, Project Description.

11.2 ACCESS TO ENERGY

Access to energy was identified as a major concern among those living along the route during consultation. This is due to the limited availability of energy in communities on the pipeline route, caused by a lack of infrastructure, intermittent supply and poverty (see Section 9, Socio-economic Baseline for more information). During the winter months particularly, the lack of gas or electricity to heat and light homes has a severe negative impact on the health, well-being and the standard of living of communities.

The initial perception of many people living within project-affected communities was that development of the BTC pipeline and SCP would directly provide them with energy. The nature of this issue however differs from others discussed in this Section since the project as designed will have little direct impact on existing access, and the provision of national energy supply and infrastructure remains the responsibility of the national Government. Given the limited impact of the project in this domain, the broader indirect issue of improving access to energy for pipeline-affected communities has not therefore been dealt with in detail in this ESIA. These issues are however reviewed in the macro-level report 'Economic and Social Implications of ACG/BTC (and Shah Deniz) in the Regional and National Context'. As development of the BTC and SCP projects will indirectly increase the ability of the Government to address energy supply issues access to energy has also been addressed in more detail in Section 12, Residual Impacts. During the consultation process care has been taken to ensure that people have been increasingly informed of this situation.

11.3 LOCAL EMPLOYMENT AND PROCUREMENT OPPORTUNITIES

Community level consultation showed that unemployment, and the poverty that accompanies it, is the primary concern amongst communities along the proposed pipeline route.

Local employment and procurement opportunities will be available to both project affected communities, and to workers and companies at the national level. Mitigation measures seek to address each of these two groups, but provide opportunities to candidates from pipeline affected communities in preference to other Azerbaijani nationals where practical.

11.3.1 Aspects of Project giving rise to Employment and Procurement Impacts

11.3.1.1 Local labour requirements during construction

The detailed labour requirements for the project will not be known until the appointment of the construction contractor. This section therefore includes a preliminary assessment of the number of workers that will be required which should be regarded as indicative only, and will change prior to commencement of the project.

It is currently estimated that approximately 1,900 people will be employed during peak construction periods (approximately 12 months) for construction of the pipeline and in management of the construction camps and pipe yards. This includes a combination of skilled, semi-skilled and unskilled workers. Skilled workers will include experienced professional staff in categories such as welding and machinery operation. Semi-skilled workers will include

experienced drivers, mechanics, night watchmen and chefs. Unskilled work may include sand bag filling, acting as a banksman for machine operators, hustling skids etc and workers may be employed with no prior construction experience, though preference will be given to applicants with experience. Approximately 1600 of these jobs will be in pipeline construction.

Skilled and semi-skilled workers will normally be expected to move with the construction activities along the length of the pipeline to avoid safety issues associated with constant re-hiring. Unskilled workers will probably be hired for shorter periods as construction passes through their area.

- At peak, the number of pipeline jobs created by this project will be approximately 1600. It is currently estimated that Azerbaijani nationals should be able to fill 50 to 80% of these jobs. This will be dependent upon whether a suitable number of Azerbaijani nationals are found to possess the necessary skills for certain jobs
- Approximately 300 workers will be employed at the potential construction camps³ and pipe yards⁴ at peak periods in the pipeline construction process. Each camp is likely to require around 100 support staff and each pipe yard is likely to require around 30 support staff. These will be primarily Azerbaijani nationals. The total of 300 workers is based on the assumption that two construction camps will be operating at any one time, and about four of the eleven yards. The actual number of camps and yards will be determined by the construction contractor.

The construction phase is expected to last about 14 months. However the peak construction period will be approximately 12 months and many of the jobs will only be available for a proportion of the overall period.

11.3.1.2 Direct Local Labour during Operations

The SCP Partners anticipate that approximately 100 staff will be directly employed during the operational phase for BTC and SCP in Azerbaijan and Georgia combined. In the first year of operation (2004), approximately 80% of these staff are expected to be Azerbaijani and Georgian nationals and the remainder expatriate workers. Staff that are expected to be employed include operations staff or technicians, security staff, cleaners, kitchen staff and drivers working at the AGIs, plus up to 100 horse patrol staff, employed in patrolling the WREP, SCP and BTC pipelines.

11.3.1.3 Procurement of Goods and Services During Construction and Operation

The project will provide direct service opportunities for companies at the national and regional level, and also to some extent for communities along the route. This is contingent on whether local suppliers can offer sufficient quality and reliability and can meet the stringent standards, particularly on health and safety set by the SCP Partners, but required of all parties involved in the project (including sub-contractors). The types of local contracts that are anticipated during construction and operation are shown in Table 11-1 below. A large proportion of these services

³ Mugan KP 63, Kurdemir KP 128-132, Ganja KP 297-302 and Poylu KP 410.

⁴ Proposed sites at Sangachal (Umbakie) KP 2, Mugan KP 63, Kurdeimiri KP 128-132, Udjar KP 175-177, Leki KP 205, Guvekend KP 205, Yevlah KP 231, Ganja KP 297-302, Deller KP 340, Zeyem KP 354, Boyuk Kesik KP 440 were investigated during this ESIA.

are most appropriate for the construction camps. In addition there will be secondary employment and local development of small supporting businesses.

Table 11-1 Goods and Services with Potential to be Procured Locally

CONSTRUCTION	OPERATION
• Catering services to camps and construction sites	• Catering services to manned AGIs
• Laundry services to camps	• Laundry services to manned AGIs
• Security services at camps and construction sites	
• Supply of vehicles (e.g. imported tractors, trucks)	
• Provision of food supplies (indirectly through catering services)	
• Supply of bottled water	
• Supply of some construction equipment and materials, including timber, stone, land re-instatement materials	
• Aggregate for road repairs	

11.3.2 Identification Of Employment and Procurement Impacts

Table 11-2 outlines potential employment impacts, the management and mitigation measures developed to address these, and any residual impacts following the management of the impact. The table includes both positive and negative impacts. The management and mitigation measures aim to maximise the proportion of Azerbaijani staff employed during pipeline construction and operation.

Except for measures which will be directly implemented by the SCP Partners, the majority of these mitigation measures have been integrated into the Invitation To Tender (ITT) documents for both pipeline and AGIs construction so that each construction contractor will be required to implement these measures as part of their contract. The proposed implementation measures from each contractor will be judged during the bid evaluation process. The contractors may identify additional or alternative measures and these will be agreed in discussion with SCP Partners. Details will be finalised in the Environmental and Social Management Plans and other relevant management plans prepared by the selected contractors. Further mechanisms will be agreed to monitor implementation of the measures. Section 14, Management and Monitoring Plan provides further details on this.

The management and mitigation measures in this Section focus on SCP. Mitigation measures relating to training and skills development will be developed in association with BTC, in recognition of the common interests of the two projects. This section is based on the assumption that construction of the SCP pipeline will follow immediately on from the BTC project. The following impacts are discussed in Table 11-2:

- E1 Direct Employment
- E2: Wide Distribution of Employment Opportunities
- E3: Recruitment process
- E4: Employment Expectations
- E5: Working Conditions
- E6: Wage Levels among Project Workforce
- E7: Enhanced Local Skills
- E8: Indirect Employment Opportunities

- E9: Local Produce Supply/Neglect of farmland
- E10: Direct Employment – operational
- E11: Local Skills - operational

Table 11-2 Impacts and Mitigation Measures: Employment Issues

Issue No	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
CONSTRUCTION PHASE			
E1	<p>Direct Employment There will be a positive short-term impact on workers employed during the construction phase, and on their families and communities, particularly given the lack of employment in the Districts crossed by the pipeline. Unskilled workers will benefit most since skilled workers are more likely to have left the region to find employment elsewhere.</p>	<p>Recruitment Targets Local and national employment targets with the construction contractor during contract negotiations, to maximise local employment. These will be reviewed and revised by the SCP partners in negotiation with the contractor. These will include a breakdown of targets for skilled and unskilled labour, from pipeline-affected communities and from Azerbaijan as a whole.</p> <p>Performance against these targets will be monitored during construction.</p>	Additional money injected into communities from wages: beneficial
E2	<p>Wide Distribution of Employment Opportunities The scale and distribution of this impact will depend on the geographical spread of employment, the period of employment and to what extent new workers can be hired in different districts. The recruitment process will therefore largely determine this impact.</p>	<p>Managing Local Recruitment The contractor will ensure there is a “preferential” approach to recruitment. Priority will be given to workers from pipeline affected districts.</p>	

Issue No	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
		<p>The construction contractor will have outlined an employment strategy for BTC for unskilled and skilled labour based on regional recruitment (as opposed to recruitment only in Baku) and to ensure a focus on pipeline affected communities and to demonstrate that similar numbers of people are employed from each region. This will be revised and reviewed at the commencement of SCP construction. The distribution of jobs will be monitored as a KPI. A project information centre will have been established in each District crossed by the pipeline and will serve as a source of information on potential job opportunities and probably as a location for recruitment.</p> <p>This strategy will include procedures to identify and verify the areas in which applicants live, as well as information on experience, skills and potential training needs.</p> <p>In the event that it is not possible to recruit sufficient, suitably qualified workers at the local level, the contractor will recruit at the national level.</p> <p>The contractor will be required to set out the rationale for any employment of third country nationals.</p>	<p>Wide Distribution of Economic Benefit: beneficial</p> <p>Un-met Employment Expectations: high</p>

Issue No	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
E3	<p>Recruitment process</p> <p>Whenever and wherever employment opportunities are available there is the potential for undue influence and/or bias in the recruitment process. This can lead to an unfair distribution of employment opportunities and resentment among local communities.</p> <p>Consultation showed that this is a concern within project-affected communities.</p>	<p>The contractor will be required to work with the SCP Partners to establish recruitment procedures that are transparent, public and open to all regardless of ethnicity, religion, sexuality or gender. Deviations from these procedures will not be tolerated.</p> <p>'Preferred individuals' lists will not be accepted by the contractor – applications will be accepted from all people within the appropriate geographic area.</p> <p>Recruitment procedures will be overseen by SCP Partners to address community concerns about the transparency and openness of the process. It is possible that a respected, informal, local community leader such as an Aksakal can also oversee recruitment.</p> <p>In addition, the contractor will be required to ensure that a clear and sufficiently specific description of available jobs is available to interested parties.</p> <p>The employment strategy will be distributed to all pipeline affected communities, at least one month prior to the date of recruitment in that area. This will probably be done via distribution of leaflets and posters placed in public locations.</p> <p>The project will regularly monitor and periodically audit the contractors recruitment process.</p>	<p>Un-met Employment Expectations: high</p>

Issue No	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
E4	<p>Employment Expectations</p> <p>Given the high levels of local unemployment, the number of people applying for jobs is likely to be greater than the jobs available. Further, the project will be constrained in its ability to employ Azerbaijani nationals by the availability of appropriate skills.</p> <p>There may therefore be a negative impact of frustration and potential resentment among unsuccessful applicants, and in communities where none or very few workers are employed by the project. The levels of frustration and resentment will depend on the final distribution of employment, and how well the expectations of applicants are managed.</p>	<p>The project will seek to manage expectations of employment at both local and national levels. The limited number of jobs available during construction and operation, and their estimated duration, has been outlined to communities during a part of the ESIA consultation process (December 2001 and January 2002). This will be reinforced in greater depth during the ESIA disclosure process.</p> <p>Information will be provided to communities and potential applicants once the construction contractor has finalised the recruitment plan with the SCP Partners. Information will include job descriptions specifying skills levels required. By doing this, wholly unsuitable candidates are less likely to apply for jobs and be rejected.</p> <p>The SCP Partners will also provide details of the estimated number and duration of employment opportunities to Government, media, and other interested stakeholders prior to and during the construction process. Information on recruitment procedures and the location of information centres will also be provided.</p>	<p>Un-met Employment Expectations: high</p>

Issue No	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
E5	<p>Working Conditions</p> <p>The terms and conditions of work (e.g., hours of work, overtime, wages etc) that are specified in workers' contracts will have an important effect on the quality of life of local and foreign workers, (e.g. health and safety effects of long work hours).</p>	<p>Construction contractors have been required (via the ITT) to apply BP's corporate policies on employees, relationships and ethics and the 8 core ILO conventions (See Section 6, Legislation and Policy Framework). Contractors will also be required to abide by the SCP project Statement of Social Objectives (see Section 6 Legislation and Policy Framework).</p>	<p>There should be no residual impact if mitigation measures are effectively implemented.</p>
E6	<p>Wage Levels among Project Workforce</p> <p>There is a potential impact, in terms of frustration and resentment, if local workers perceive that foreign workers are receiving better pay or conditions for exactly the same job. This was highlighted as an issue during consultation. In reality it is unlikely that a foreign worker will be employed in a job for which there is a local labour pool and therefore this impact is more one of perception rather than fact.</p>	<p>The contractor will be expected to pay at least the minimum wage to all workers.</p> <p>Community Liaison Teams will be made aware of this as a possible issue since there is a common perception of inequality, which can persist and needs to be diffused.</p>	<p>Differential Wages among Project Workforce: Low</p>

Issue No	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
E7	<p>Enhanced Local Skills</p> <p>There will be a positive impact on local skills through the experience gained by workers and any training that they receive. The scale of the impact will depend upon the quality of the training programme, the work experience, and the individuals themselves.</p> <p>It is likely that the entire workforce will need at least some training prior to employment, in order to perform tasks to the international standards that have been set by the project on issues such as Health, Safety and Environment (HSE).</p>	<p>Training</p> <p>The contractor will have developed a comprehensive training programme for BTC to enhance the numbers and skills level of national employees (including through subcontractors). This training programme will continued in order to maximise the opportunities for country nationals to gain employment in skilled and semi-skilled roles during the construction of the pipelines.</p> <p>The training programme will include refresher and induction training to ensure that all recruits have the necessary understanding and knowledge levels for each job, in particular with regard to HSE issues.</p> <p>On the job informal training sessions and discussions will be provided as necessary during the construction and operation of the pipeline.</p>	<p>Enhanced Local Experience and Employability: Beneficial</p> <p>Subsequent out-migration as a result of enhanced skill levels: Low</p>

Issue No	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
E8	<p>Indirect Employment Opportunities</p> <p>There will be a positive economic impact through the provision of goods and services at national and local levels, close to construction activities and at camps, and pipe yards during construction and near permanently manned AGIs and maintenance facilities during operation.</p>	<p>As part of the tender process, the construction contractor is required to identify and pursue opportunities to enhance local sourcing of goods and services. This will include sourcing for construction camps.</p> <p>In addition, a seminar was held in early March in Baku to update local businesses on supply opportunities that will be available. This seminar:</p> <ul style="list-style-type: none"> • explained what sub-contracts might be available; • explained what sub-contractors need to do in order to be better placed for this work • provided the same level of information to all potential sub-contractors <p>In addition the SCP Partners and BTC Co will open an Enterprise Centre in Baku to help Azerbaijan-owned and based companies to develop their business in support of major oil and gas developments in Azerbaijan. The centre will provide resources for suppliers, and information on current and future supply opportunities, Health and Safety Expectations, quality and business conduct, required technical standards etc. The centre will also provide training, workshops and seminars.</p>	<p>Economic benefit from in-direct employment opportunities: beneficial</p> <p>Enhanced capacity to tender for international contracts: beneficial</p>

Issue No	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
E9	<p>Local Produce Supply/Neglect of farmland</p> <p>There is a potential 'boom-bust' impact on communities in the vicinity of construction activities for a short period. This could be caused by a short term high demand for goods and services followed by a decline in demand as construction moves on.</p> <p>The probability of this occurring is considered to be fairly low.</p> <p>The most likely areas of impact are in communities nearest to large construction camps where economic opportunities are greatest.</p> <p>There is also the risk of the neglect of farmland given the likelihood of better wages associated with the project. However, there is considerable excess labour available at community level to maintain agricultural activities. Hence this is unlikely to be a significant impact.</p>	<p>Communities will be provided with information about the duration of construction activities in their vicinity during the consultation and community liaison process.</p> <p>The construction contractor is required to submit procedures for local sourcing needs to the SCP Partners. These will be made available to local businesses via the Enterprise Centre in Baku. This will help local communities to plan more effectively. The more detailed the plan the more effective it will be in allowing communities to assess their ability to provide goods and services without compromising their own standard of living and their future livelihood.</p> <p>The Project is also developing a Community Investment Programme (see Section 13, Cumulative Impacts) that will provide communities with sustainable skills that will help them in the longer term.</p>	<p>Economic benefit from in-direct employment opportunities: Beneficial</p>

Issue No	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
	OPERATIONAL PHASE		
E10	<p>Direct Employment</p> <p>There will be a major positive economic impact on the number of people employed permanently during the operational phase. This will have a small multiplier effect for local communities but this will not be significant given the small number of people who will be employed.</p> <p>There will be additional positive impact from those employed in associated activities e.g. waste management, reinstatement etc.</p>	<p>The SCP Partners will support initiatives and programmes to increase the proportion of local staff employed in the operating company, and to raise skills levels during the operational phase with a long term view to maximising local operation. Local staff will be supplemented in the short-medium term by experienced expatriate staff that will provide necessary supervision and coaching during the initial period of pipeline operation. These expatriate staff will be selected for their training and coaching skills, as well as their proven HSE and technical expertise.</p> <p>Expatriate staff will be phased out when national staff have acquired and demonstrated the required competence and skills.</p>	<p>Additional cash injected into communities from wages: Beneficial</p> <p>Reduced Economic Spend in Communities by Foreign Workers in Operational Phase: Low</p>
E11	<p>Local Skills</p> <p>Individuals employed during the operational phase will benefit from personal development opportunities.</p>	<p>A comprehensive training programme will be developed for all national staff. The training will be carried out early enough to enable local staff to participate in site pre-commissioning and commissioning activities. The training programme will be conducted within the framework of BP's Competence Management Assurance system, which will involve the identification of required and actual skills profiles for all operational staff and the development of associated training and assessment modules. The SCP Partners will continue to encourage national staff to develop their skills during their employment</p>	<p>Enhanced Local Experience and Employability: Beneficial</p> <p>Reduced Economic Spend in Communities by Foreign Workers in Operational Phase: Low</p>

11.4 LAND ACQUISITION AND LAND-BASED LIVELIHOODS

11.4.1 Introduction

Experience of the WREP has shown that land and the protection of land-based livelihoods is an important community issue. This section outlines policies and principles to be applied in all cases where the SCP project construction activities and operations involve impacts on land, houses and structures, non-moveable assets, land-based livelihood and employment. Detailed land expropriation and compensation procedures are still being formulated and will be documented in a Land Acquisition and Resettlement Plan based on World Bank Group requirements. This Section outlines the principles that are being followed to address land expropriation and associated physical and economic impacts on land owners, users and occupiers in Azerbaijan. No households will require physical resettling.

Project land acquisition and associated livelihood impacts will be addressed in accordance with international good practice as embodied in the policies and guidelines of the IFC/World Bank Group. Requirements contained in Azerbaijan legislation and the project HGA will also be complied with. The principal World Bank instrument governing project impacts resulting from land expropriation is World Bank OD 4:30 *Involuntary Resettlement*⁵. (See Section 6 for further information on this policy).

11.4.2 Project Land Requirements

The SCP project in Azerbaijan will make use of the following land areas during a 15-24 month construction period⁶:

- A construction corridor approximately 32m wide by 442km long⁷
- Land for construction camps (approximately 500 x 500m). Sites considered in this ESIA are at Mugan (KP 63), Kurdemir (KP 128-132), Ganja (297-302) and Poylu (KP 410), however the construction contractor will determine the number and location of sites to be used.
- Pipe yard sites, ranging in size from 2,000-50,000 square metres. Sites considered in this ESIA are at: Sangachal (KP 1-2), Udjar town (KP 178), Leki (KP 205), Guvekend (KP 205), Yevlah town (KP 231), Ganja town (KP 297-302), Deller (KP 340), Zeyem (KP 354), and Boyuk Kesik (KP 440), however the construction contractor will determine the number and location of sites to be used
- Land for temporary access roads (may become permanent and revert to local authority control in environmentally non-sensitive areas where communities make a case to maintain them)

⁵ There are presently two involuntary resettlement policies in force within the World Bank Group. IFC, the World Bank's private sector lending arm, uses OD 4:30 Involuntary Resettlement (June, 1990). World Bank public sector operations use OP 4:12 and SCP PARTNERS 4:12 Involuntary Resettlement (January, 2002). On advice of the World Bank Group, the project has adopted OD 4:30.

⁶ If SCP construction follows BTC, this land will be used for 3-4 years.

⁷ Acquisition of a 44m corridor to cover both BTC and SCP will take place at the same time.

The total land area required for construction (temporary use) is about 2000 hectares (preliminary estimate).

The SCP project will permanently acquire or acquire the rights to:

- 8 metre by 442 kilometre corridor of land where the pipe will lie (former owners will be able to re-use the land, subject to certain restrictions) with some restrictions on a wider corridor
- Land for access roads to the permanent AGIs approximately 4 - 6m wide that will remain after completion of the construction process.
- Approximately 5 remotely actuated block and/or check valves, which are likely to be relatively small (in the order of 7m by 8m) and located on the pipeline corridor. However, during construction additional surrounding land will be needed for each valve for temporary work space. The significance of this impact on any one individual will be assessed during the land documentation process.

Mechanisms for acquiring rights to construct and operate the SCP pipeline are presently still under consideration. These range from full ownership to various leasing arrangements. In selecting the most appropriate approach, key considerations will include:

- The overriding objective of allowing landowners, lessees and other users to resume their pre-project activities on the land around the pipeline upon completion of construction.
- The need to establish a good long-term relationship with adjacent landowners whereby there is an ongoing commitment to maintaining the pipeline corridor.
- Sufficient flexibility for the SCP Partners to safely construct and operate the pipeline and associated facilities.

All approaches will involve compensation for any loss of land or land use (temporary or permanent), assets or income caused by the project.

11.4.3 Potential Land and Livelihood Impacts

Through careful pipeline alignment and facilities siting, the SCP project will minimise impacts on housing and the need to physically relocate households. The project will involve impacts on land, productive assets, and livelihood through (i) temporary use of land for construction purposes; (ii) permanent acquisition of land (or imposition of rights to construct and operate a pipeline under existing ownership) for the pipeline alignment; and, (iii) imposition of restrictions on land use adjoining the pipeline. The project will impact privately owned land, municipal and state land, some of which is leased to private entities and individuals.

Land and related livelihood impacts of the SCP project will include some or all of the following:

- Temporary loss of use of cultivated land, with resultant loss of income for owners/lessees/other users for the three to four year construction period (assuming SCP construction will follow on from BTC).
- Permanent loss of land (and any related income) for large AGIs, block and check valve locations, access roads and other ancillary works.

- Impairment of livelihood in areas adjacent to the pipeline and ancillary facilities that are affected by restrictions on use (particularly affecting vineyards, orchards and other tree crops).
- Temporary loss of use, or physical constraints on movement, on grazing land and pasture.
- Loss of structures and land attachments (eg. wells, fences, drying yards, animal pens, water tanks etc) in the 32 metre corridor
- Possible impacts on irrigation and drainage systems
- Loss of trees / perennial crops in the 32 metre construction corridor
- Loss of annual / seasonal crops in-ground at the time land is occupied for construction
- Loss of other productive assets (such as fish ponds)
- Loss or restriction of access to communally used forests
- Impacts on enterprises (including loss of productivity, downtime)
- Loss or damage to community property and resources
- Loss or damage to community services and infrastructure
- Severance of lots with loss of productivity and income.

In-principle measures for compensation are summarised in Table 11-4. Detailed compensation and other mitigation measures for people affected by these impacts will be described in the SCP Azerbaijan Land Acquisition and Resettlement Plan (forthcoming).

11.4.4 Objectives for Land Acquisition and Resettlement

The overarching goal of the SCP land acquisition and resettlement process is:

To restore or enhance project affected peoples' living standards, income earning capacity and production to at least without-project levels

Other objectives for land acquisition and livelihood restoration are as follows:

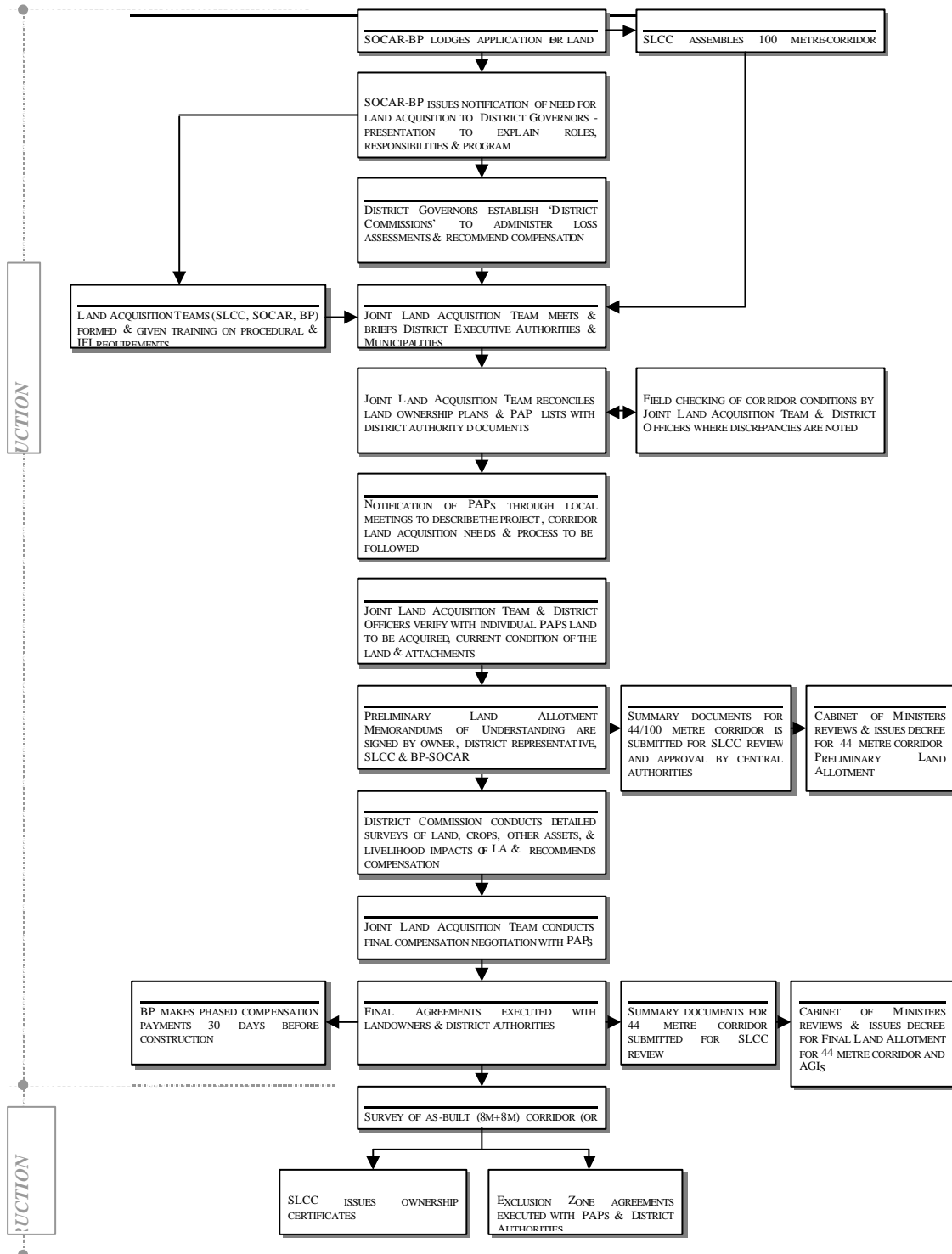
- To align the pipeline to avoid houses and settlements so that physical relocation of people and their dwellings is minimised.
- While working within technical constraints, to carefully consider pipeline alignment and siting of ancillary facilities to minimise impacts on productive land and livelihood.
- To develop fair and transparent procedures for determining compensation for (i) temporary use of land for construction purposes; (ii) permanent acquisition or otherwise obtaining of rights to construct and operate a pipeline on private and state land; and, (iii) any restrictions on use that may be applied to areas adjoining the corridor and other facilities.
- To acquire land (or right to use land) through negotiated agreement, with use of powers of eminent domain only as a last resort.
- Upon completion of construction, to reinstate the pipeline corridor to a condition whereby landowners/users/lessees are able to resume their pre-project agricultural activities.
- To adopt design standards that minimise the need to impose restrictions of use on adjoining areas.
- To compensate for permanent use of land at full replacement cost inclusive of all transaction costs.
- To keep affected people and communities fully informed about the project, the process that will be followed to acquire and compensate for land, and their related rights and avenues for redress.

- To monitor the effectiveness of mitigation measures described in the SCP Azerbaijan Land Acquisition and Resettlement Plan and, if necessary, to take corrective action to ensure affected peoples' living standards and incomes are fully restored.

11.4.5 Land Acquisition and Resettlement Procedure

SCP Azerbaijan's land acquisition process is shown diagrammatically below in Figure 11.1.

Figure 11.1 Land Acquisition Process



11.4.6 Implementing Roles and Responsibilities

Roles and responsibilities for land acquisition are summarised in the Table 11.3 below

Table 11-3 Land Acquisition Roles and Responsibilities⁸

Activity	Purpose	Period	Responsible Authority	Implementation
Application for allocation of land for the pipeline corridor	To secure Azerbaijan Government approval for allocation of land for the project	Pre-sanction	SLCC	SOCAR & SCP Partners prepare the application
Research of land title & ownership details	Preliminary identification of project affected landowners, occupants or other users.	Pre-sanction	SLCC	SLCC with Lands Departments, District Authorities
Notification & preliminary consultation with project affected people	Meetings to advise landowners, users, & / or occupiers of the need to acquire their land and the procedures that will be followed.	Pre-sanction	District Authorities	Local Executive Authorities, municipalities, with Joint Land Acquisition Team
Socio-economic survey of affected people	To assess affected household characteristics, living standards & livelihood sources as basis for identifying resettlement impacts, & establishing monitoring baseline.	Pre-sanction	SCP Partners	SCP Partners with local SIA consultants
Signing of Initial Land Acquisition Agreements with land owners & users	Agreement by affected owners that corridor land may be acquired with a description of acquisition area & its condition including any affected premises or facilities, crops, trees or other attachments	Pre-sanction	SLCC	Representatives of SLCC, district government, SOCAR, SCP Partners & owner sign the Initial Agreement.
Survey and loss assessment	To assess all land, assets, livelihood impacts as basis for valuation	Pre-construction	District Executive Authority	District Commission
Valuation of land, assets & livelihood to be lost & recommendation on compensation	To define amount of compensation payable for temporary & permanent use of land.	Pre-construction	District Executive Authority	District Commission
Final negotiation of compensation	Based on the recommendation of the District Commission, LAT	Pre-construction	SOCAR/SCP PARTNERS	Joint Land Acquisition Team ⁹

⁸ The Government of Azerbaijan has been assigned responsibility for land acquisition within the HGA. However SCP Partners is assisting the government to ensure a fair and equitable process.

⁹ Joint Land Acquisition Team comprises representatives from SLCC, SOCAR, relevant district authorities and SCP Partners.

	negotiates final negotiation with affected people.			
Execution of Final Land Acquisition Agreements	To summarise the basis and compensation to be received by each affected landowner/user/occupiers	Pre-construction	SLCC	Representative of SLCC, district government, SOCAR, SCP Partners & owner sign the Final Agreement.
Payment of compensation	To review relocation site options & recommend a preferred option – in consultation with affected owner	Construction (30 days before land required for construction)	SOCAR	SCP Partners makes compensation payment direct to affected parties (& later reconciles with SOCAR through HGA)
Issue of new ownership agreements (if ownership option is taken)	To formalise all transfers of land ownership - (replacement land to affected people, 8+8 corridor to SOCAR	Post-construction	Cabinet of Ministers	SLCC prepares State Act & Certificates of Land Ownership & Use
Exclusion Zone Agreements	Formalise restrictions of use over the pipeline corridor with adjacent landowners/users	Post-construction	Ministry of Fuel & Energy	SOCAR, District Authorities
Monitoring	To verify reinstatement, receipt of entitlements & monitor effectiveness of any livelihood restoration	All phases	AIOC/SCP Partners	SCP Partners Community Liaison Officer supported by local SIA consultants Third Party Monitor

11.4.7 Consultation and Disclosure

Measures for consultation and disclosure are outlined in the SCP project Public Consultation and Disclosure Plan (PCDP). The IFC/World Bank Group requirement for 120 day in-country and international disclosure of the Land Acquisition and Resettlement Plan will be complied with.

11.4.8 Grievance Procedures

So far as possible, the SCP project will seek to resolve grievances outside of the judicial system. Avenues for project affected people to express grievances, including through independent third parties, will be publicised in each village as part of the land acquisition notification process and in project information pamphlets. The project will establish mechanisms to receive grievances, facilitate grievance and dispute resolution and monitor outcomes. A register of all grievances, corrective actions and outcomes will be maintained from the commencement of the land acquisition process.

In the event of failure of non-judicial approaches to grievance resolution, Azerbaijan legislation provides for aggrieved parties to take action through civil courts, with avenues for appeal.

11.4.9 Liaison with Communities

A tripartite land acquisition team has been formed to notify and inform affected people about the nature of the project, the need for land acquisition, and their rights and obligations with respect to the acquisition process. The land acquisition team is made up of officers from the State Land Committee, SOCAR (the government agency acquiring the land) and SCP Partners. Land officers received three weeks training covering the legal framework governing land acquisition, the World Bank's land acquisition and resettlement policies and techniques for consultation and interaction with affected communities.

This team will represent the project in terms of notifying project affected people, negotiating preliminary and final agreement, carrying out inventories of affected crops and assets, and determining compensation amounts.

Selected land officers will be available as a point of contact for communities on property and land issues during construction. They will report to the project Community Relations Manager who will be appointed prior to construction commencement.

11.4.10 Valuation Methods and Compensation

In each district crossed by the pipeline, the Head of the Executive Power will establish a "valuation commission" to undertake a valuation of land, crops and assets that will be lost to the project. The commission will consist of representatives of the District Agricultural Industry Association (normally the Chairman), District Financial Department and Land Department as well as representatives of other interested parties. The commission will prepare a recommendation on the compensation payable to affected land owners and users, using methods defined in Azerbaijan legislation. Using this recommendation as a starting point, the joint land acquisition teams will negotiate a final settlement with affected land owners and users.

Taking into account Azeri legislation and the requirements of the World Bank, whichever is more stringent, the SCP Partners will develop fair and transparent procedures for valuation and compensation for temporary use and permanent expropriation of land. Where appropriate, the project will make use of independent third party land appraisers to assist with determining fair compensation rates. All compensation rates and entitlements will be publicly disclosed and adjusted if necessary to take into account any feedback received.

11.4.11 Documentation of Land Ownership and Use

The SLCC, with support from the project land acquisition teams, has completed land parcel and owner identification surveys. Land parcel and ownership information is subsequently verified with district officers, and where necessary in the field. In instances where land owners with formal land rights have not registered their ownership or lease, or where land has been transferred without registration, the project will facilitate owners/lessees with completion of registration formalities ahead of negotiations.

11.4.12 Negotiations

The tripartite land acquisition teams will negotiate directly with the owner, lessee, or user of any asset (land or otherwise). All transaction costs including fees for notarisation, registration and transfer taxes will be borne by the project.

11.4.13 Eligibility for Compensation

In determining eligibility for compensation, the SCP project will follow the guidelines of the World Bank. World Bank OD 4:30 *Involuntary Resettlement* notes that lack of legal title does not disqualify people from receiving resettlement assistance. A census of all project affected people, including informal dwellers, has been undertaken as part of project resettlement planning. Based on the findings of the census and of an associated socio-economic survey, resettlement assistance measures will be formulated to address the needs of informal dwellers.

Table 11.4 outlines the potential impacts, mitigation measures and residual impacts for property damage and land acquisition issues as follows:

- L1: Permanent expropriation of land
- L2: Land Use on the ROW and on construction sites
- L3: Separation/isolation of land plots with loss of productivity and income
- L4: Soil fertility investments/Future Degradation to land
- L5: Infrastructure: Houses and other buildings, fencing, irrigation channels etc
- L6: Damage to property outside ROW and approved construction areas
- L7: Loss/damage to other productive assets
- L8: Impacts on enterprises (including loss of productivity, downtime)
- L9: Restrictions on land use

Table 11-4 Impacts and Management and Mitigation Measures: Property Damage and Land Acquisition Issues

Issue No	ISSUES/IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
	Construction		
L1	Permanent expropriation of land (and any related income) for AGIs, block and check valve locations, access roads and other ancillary works.	<p>In-principle measures – to be developed in detail during Land Acquisition and Resettlement Plan preparation)</p> <p>Cash compensation based on market value of land or, where this is not readily assessable, on an expert appraisal of land value based on an explicit procedure. These will take into account land quality, extent of improvements, access to irrigation, historical productivity, etc.</p> <p>Loss of productive land has been minimised through careful attention to siting AGIs and permanent facilities.</p> <p>Where project land expropriation results in a household permanently losing use of land to the extent that the of balance land is no longer economically viable, project to provide option of cash compensation or replacement land within the village (if available) of equivalent size and quality. Where replacement land is of lower quality, the project will provide transitional income support and assistance with land improvement. Assistance with full resettlement to World Bank standards, if required.</p>	<p>Loss of productive land: low</p> <p>Changes in livelihood source as a result of land loss: low</p> <p>Additional cash injected into local communities: beneficial</p>
L2	Land Use on the ROW and on construction sites Land use, both agricultural and pastoral, will be	The extent of household reliance on subsistence	Additional Damage to Land and/or

Issue No	ISSUES/IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
	<p>interrupted by the construction process for three to four years (if SCP follows on immediately from BTC). This will impact on the ability of households and communities to sustain their agricultural livelihoods, as in general, it is likely to affect land on which grain and vegetables are grown, or pastures on which animals are grazed.</p> <p>The land acquisition process will determine exactly how many individual households will be impacted by the temporary or permanent land take.</p> <p>The construction process is less likely to affect land immediately adjacent to or nearby houses as the proposed pipeline will in general not be close to such land plots, except at Anver Memmedhanly (KP 163 +400), Gulabend (KP 169 +500) and Garaberk (KP 174+800). HDD has been specified at KP 163 +400 and KP 174 +800.</p> <p>Construction will have a major impact for those who own orchards that cross the ROW given that all trees on the route will be removed and the time required to re-grow trees to harvesting maturity</p>	<p>food sources will be assessed during the Land Acquisition and Resettlement Plan socio-economic surveys.</p> <p>The SCP Partners will be responsible for compensation for property damage and loss of amenities within the designated construction corridor, and at all designated construction sites outside the pipeline corridor. Cash compensation will be provided for lost agricultural productivity during the construction period.</p> <p>Adequate notice of the pipeline construction schedule will be provided to affected farmers so that they don't un-necessarily lose crops.</p> <p>Cash compensation will be provided based on the cost of planting, labour and fertiliser inputs required to bring the tree or vine to maturity, plus the cost of the lost production for the period it will take a sapling to reach the production level of the tree/vine at the time it is lost to the project.</p> <p>For mitigation measures to minimise damage to houses close to construction activities see issue L4 below</p> <p>Land used during the construction process will be re-instated. A reinstatement summary plan can be found in Appendix Volume One, Part 4. In summary, all agricultural and pasture land, except that needed permanently for AGIs and</p>	<p>Property: Low</p> <p>Possible small increases in demand for staple foods in local markets as land affected households replace consumption of crops grown for subsistence with purchased foodstuffs: low.</p> <p>Additional cash injected into local communities: beneficial</p> <p>Reduced labour requirement in some affected households due to reduced area for cultivation and harvest: low</p> <p>The Community Liaison Grievance Procedures may be used by households who experience hardship as a result of the project.</p>

Issue No	ISSUES/IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
		<p>new access roads, will be restored to at least the condition it was in prior to construction. Agricultural land will be left graded and tilled ready for the farmer to re-plant. Where land must be re-planted in order to prevent erosion, the regime will be agreed with the landowner.</p>	
L3	<p>Separation/isolation of land plots with loss of productivity and income.</p> <p>Construction activity or the building of permanent infrastructure (including access roads) may in some instances separate or isolate a land plot leaving a portion inaccessible or of a size that is not economically viable or feasible to work.</p>	<p>The project will consider; (i) compensation for lost production on that portion for the construction period; or (ii) outright purchase where the severance is long term and has a negative economic impact.</p> <p>In the case of (ii) livelihood restoration measures (such as replacement land or agricultural intensification on the affected households' remaining land) will also be required.</p>	<p>Grievances over land compensation: Medium</p>

Issue No	ISSUES/IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
L4	<p>Soil fertility investments/Future Degradation to land</p> <p>There is potential for a long-term negative impact to farmers along the route if the soil fertility, and therefore agricultural yield, is reduced as a result of construction. While it is unlikely that there will be a long-term decline in soil fertility along the ROW, WREP experience shows it is possible that there will be pockets of such cases. Without additional mitigation to address reduced soil fertility, the duration will be long-term.</p>	<p>A Reinstatement Plan has been developed to ensure that agricultural fertility is maintained as far as practical.</p> <p>If necessary, the SCP Partners will provide compensation as outlined in the compensations procedures of the RAP.</p>	<p>Grievances over land compensation: Medium</p>

Issue No	ISSUES/IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
L5	<p>Infrastructure: Houses and other buildings, fencing, irrigation channels etc</p> <p>Farmers commonly dig irrigation and drainage ditches, install fences or walls on land. These “investments in infrastructure” may be impacted during pipeline construction. They are more common on certain types of land than others. For instance, fields for growing cereals or fodder are rarely irrigated, but vegetable fields often are.</p> <p>In addition to individually owned and maintained irrigation channels, large-scale irrigation systems may be impacted. While many are already in a state of disrepair, the project must be careful not to leave systems in worse condition than found in.</p> <p>Any houses or other buildings located close to the construction corridor and to access roads may be impacted by vibration damage due to the use of heavy vehicles. Most likely damage would be cracking to walls.</p> <p>The areas of impact will not be determined until the contractor has finalised the Traffic Management Plan. Based on current knowledge, this impact could occur at housing close to heavily used access roads.</p>	<p>The SCP Partners and the construction contractor will always seek to avoid causing damage to infrastructure where possible. General measures to protect infrastructure impacted through the construction process are outlined in Section 11.5.</p> <p>Where damage can not be avoided cash compensation based on full replacement cost (as required by the World Bank), or replacement structures/facilities will be provided.</p> <p>In addition, the construction contractor will assess and document the likely impact on houses adjudged to be close enough to traffic routes where there is a risk of vibration induced impacts. This documentation will be agreed with the house owner/occupants and a copy of documentation provided to the house owner/occupants.</p> <p>The full re-instatement option will involve direct replacement of the structure by the SCP Partners with no cash transaction taking place.</p>	<p>Damage to infrastructure or housing not repaired or not compensated: low</p> <p>Grievances over land compensation: Medium</p>
L6	<p>Damage to property outside ROW and approved construction areas</p> <p>There is a potential impact of damage to land, property and infrastructure outside of the ROW.</p>	<p>All construction activities will be undertaken within predetermined working areas for which</p>	<p>Additional damage to land/and or property: low</p>

Issue No	ISSUES/IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
	<p>This could involve:</p> <ul style="list-style-type: none"> • clearing land beyond the project working areas for which compensation has been paid; • vehicles or people straying outside working areas and causing damage to land and crops. • Damage to farming land near the ROW if access to irrigation is blocked by construction. • Adverse effects of dust on crops 	<p>compensation procedures have been completed. Any damage caused by the construction contractor outside these boundaries will be compensated accordingly and will be the responsibility of the construction contractor.</p> <p>The requirement to keep within the working area will be strictly enforced and emphasised to the work-force during inductions and tool-box talks.</p> <p>Working areas will be determined prior to construction. Sites will be demarcated as necessary using fencing, marker posts or, signs. Permanent facilities will be fenced. For the pipeline ROW, stakes will be placed to identify the working width. Fences will be used close to occupied properties or sensitive areas where this is deemed the most appropriate mechanism to assure safety of people, livestock and property</p> <p>The SCP Partners will monitor the impact on land and property outside the ROW and approved construction areas.</p> <p>The construction contractor will also be responsible for negotiating compensation for any additional construction sites required and SCP Partners will monitor this.</p>	<p>Grievances over land compensation: Medium – low depending on the number of incidents within a community</p>
L7	<p>Loss/damage to other productive assets In addition to land, crops and trees, the construction process may damage other productive assets such as livestock, bees, etc.</p>	<p>Livestock BP and the construction contractor will identify principal livestock movement corridors and program construction activities to avoid seasonal</p>	<p>No residual impact if mitigation implemented.</p>

Issue No	ISSUES/IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
	<p>Livestock During construction, the ROW open trenches will be a physical constraint to livestock movement, and pastures in the 32-metre corridor will be lost for grazing use.</p> <p>There is a potential impact arising from loss of livestock due to accidents related to construction (animals being struck by machinery, animals falling into the open trench, etc.).</p> <p>Bees Bee keeping is not a major commercial activity along the route. However some households do keep bees to provide honey for personal use and occasional sale.</p> <p>The project may physically disturb bees where hives are located within about 250- 300 metres of the pipeline. This is primarily due to dust (bees are sensitive to intensive dust on themselves and the surrounding flora), noise of the machinery and vibration at very short distances. Once the honey production season begins, bees, if moved, will attempt to return to their original home even if the hive has been moved, unless the move is greater than a 5 km radius. Bees will have been moved for the BTC project</p> <p>It is expected that all bee hives within 300m of the route will already have been moved for the BTC</p>	<p>movements, or incorporate appropriate crossings at key locations. Further measures are identified in Section 11.5, I5 and I6.</p> <p>Compensation if necessary If a temporary loss of use to a productive asset occurs, cash compensation based on an estimate of average annual revenue lost over the construction period will be provided. The asset will be restored to its original condition upon construction completion.</p> <p>For permanent loss to the asset, cash compensation based on a multiplier of fixed market rates, will be provided.</p>	

Issue No	ISSUES/IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
	project.		
L8	Impacts on enterprises (including loss of productivity, downtime)	<p>Cash compensation will be provided equivalent to lost productivity to enable employer to pay salaries and wages for duration of any downtime. Assistance will also be provided to find alternative premises and relocate plant and equipment if required.</p> <p>Measures to develop replacement employment will be implemented where the project results in any loss of employment.</p>	
	OPERATIONAL PHASE		
L9	<p>Restrictions on land use</p> <p>Following the construction period, some restrictions will apply to land use in relation to planting trees, building, drilling and deep ploughing. See the RAP for details of the land corridor which will require restricted land use.</p> <p>A combination of pipeline marker posts, concrete slabs, pipeline marker, tape, ongoing agricultural liaison, easement agreements, etc. will be used to minimise the impacts of land users on the pipelines and cables involved in BTC.</p> <p>There will be a significant impact on vineyards and orchards which cannot be replanted (checking relevance in relation to no of orchards/vineyards)</p> <p>New, deep irrigation channels will not be allowed on</p>	<p>The SCP Partners will provide compensation to landowners for restrictions on land use as set out in the RAP.</p>	<p>Grievances over land compensation: medium</p>

Issue No	ISSUES/IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
	the 8 metre ROW during operation of pipeline. However existing channels will remain and shallow channels will also be acceptable. Hence, it is not considered likely that farmers will suffer from water shortages as a result of the pipeline.	The project will replace irrigation canals and aerial canals to their pre-existing condition.	

11.5 LOCAL INFRASTRUCTURE SERVICES AND NATURAL RESOURCES

Chapter 9 (Socio-Economic Baseline) shows a lack of infrastructure and supply deficits in community services along the pipeline route and the impact of this on quality of life. This Section uses the baseline information from Chapter 9 to assess the potential impacts of the project on existing infrastructure, services and resources while Section 13.7.2, Community Investment, considers opportunities for enhancement of local infrastructure to improve the overall quality of life.

11.5.1 Aspects of Project Giving Rise to Impacts on Infrastructure, Services and Natural Resources

11.5.1.1 New and upgraded access roads for construction purposes

The construction contractor will use the ROW itself as an access road as far as possible to minimise the need to build additional roads for access purposes. Where possible, transportation routes will not go through local communities and AGIs have been located as close as possible to existing tracks. However, there will still be a requirement for use of existing and new roads to access the route, particularly for:

- The transportation of an estimated 7,800 loads of pipe by rail through the country: This equates to approximately three 750m long trains every two days, assuming that there are 45 wagons per train, and that a rail car load is 5 lengths of pipe. Other materials for the project will also be transported by rail. This will include construction material, the check and block valves themselves etc.
- The transportation of an estimated 12-13000 loads of pipe and other materials from the pipe yards (adjacent to the rail heads) onto the route itself. A truck load is a single trailer truck with 3 sections of pipe (12 metres long). If double joints are made at the pipe yards the number of loads will be considerably reduced, although the weight and lengths will increase.
- Transportation of numerous heavy vehicles to the ROW probably from rail heads.
- Transportation of local workers from designated pick-up points to the construction site and back again on a daily basis using as many as 40-50 buses daily during peak construction times
- On-going pipeline maintenance during operation

The Project team have identified potential access roads and these will have been upgraded or constructed (if necessary) and in use for the BTC project. Exactly which potential access roads will be used will not be known until the construction contractor has drawn up the Traffic Management Plan.

11.5.1.2 Power use by construction facilities and AGIs during construction and operation

The project will require electrical power prior to and during the construction phase to move rail trucks loaded with pipe and other construction materials. The power for rail transportation will be drawn from the Azerbaijani rail grid. Although this grid is separate from the national grid supplying communities, both grids are supplied from the same power stations and

additional draw on the railway grid could affect supply available to the national grid. Data on the amount of power required for rail transportation is currently unavailable.

With regard to both temporary construction sites (camps and pipeyards) and permanent facilities (valves, etc.), the ITT suggests that main power can be drawn from local supplies as long as it does not adversely affect supplies to local communities. However, because of unreliable power supplies in Azerbaijan, it is expected that most power needs will be self-generated by diesel generator. If the contractor does wish to draw power from local supplies, this will be approved by local authorities and the SCP partners in advance.

Power is needed for the operation of the 5 small AGIS, the block and check valves, and will where possible be drawn from overhead lines from existing Railways or substations or from existing power sources on the WREP. If these options are not available or reliable then stand-alone power generation will be installed in each location. The electricity requirement for the pipeline itself during operation will usually be around kilowatts for 27.5 kilowatts for SCP stand alone, or approximately 107 kilowatts for the operation of BTC and SCP combined.

11.5.1.3 Water needs for construction activities, facilities and at AGIs (construction and operations)

The project will require water for construction purposes, e.g. dust minimisation and hydro-testing of the pipeline and operations.

Construction camps will also require water for domestic uses for up to 750 people. Water for drinking purposes must meet World Health Organisation standards. This water will be bottled, trucked in or treated on site. The camps, constructions sites and AGIs will take either surface or groundwater for domestic and process use. The following volumes are estimated to be required for each activity:

- Construction camps will each require approximately 172 cubic metres per day (based on estimate on 750 workers in a camp, and including water used by the associated construction teams in the field)
- Operations phase – total water use of approximately 4 cubic metres per day

Potential water sources have been identified along the route.

Prior to start-up, the pipeline will be hydro-tested; that is filled with water and pressured to check its integrity. The testing will be carried out in sections. Nevertheless, considerable quantities of water may be required. Additionally chemicals may have to be added to protect the pipeline. Sourcing and disposal arrangements for hydro-test water are therefore very important. The quantities will depend on the selected construction contractors detailed construction testing programme

11.5.1.4 Construction and operational wastes

Construction camps will need to dispose of solid waste, human waste and domestic wastewater. In addition there will be waste arising from construction activities on the ROW and at facilities. Table 5.10 Indicative Construction Waste Breakdown contains data on the volume and types of waste that are likely to be generated by the SCP project. Mitigation measures for dealing with these wastes are described in Section 10, Environmental Impacts and Mitigation.

11.5.1.5 Telecommunications for construction and operation

The existing fixed telephone and mobile phone networks will be used for telecommunications in both the construction and operational phase. In addition, a new fibre-optic system dedicated to pipeline operation will be installed for data transfer and telecommunications when the pipeline becomes operational.

11.5.1.6 Medical and Health and Safety Infrastructure

Construction contractors will provide their own self-contained health and fire protection services.

During operations private medical and fire protection services will be used.

11.5.1.7 Open Trench

Trenches and pipes - the trenches will be on average 2.4 metres deep, approximately one metre of which will then be taken up with pipe. This is likely to be deeper in places such as river and gully crossings or landslide areas, where the depth could reach 15m in very extreme cases. It is expected that the maximum trench length open at any one time will be 15 kilometres (non-continuous) including tie-ins, crossings and special sections.

The pipeline will cross access roads, canals, and other transportation networks along the route. During construction, the average length of time the trench will remain open at a crossing is approximately 2 days.

11.5.2 Identification of Impacts on Infrastructure, Services and Natural Resources

Table 11-5 and the general measures below describe specific impacts and mitigation measures developed in relation to local infrastructure, services and natural resources. Except for measures which will be directly implemented by the SCP Partners (e.g. measures for the operational phase) these mitigation measures have been integrated into the Invitation To Tender (ITT) documents for pipeline and AGI construction. They will therefore form a part of the contract for the construction work and the construction contractors will be required to implement them. The proposed implementation measures for each contractor will be judged during the bid evaluation process. Details will be finalised in the Environmental and Social Management Plan and other relevant management plans prepared by the selected construction contractor. Additional or alternative measures may be identified in discussion with the selected construction contractor. Further mechanisms will be agreed to monitor implementation of the measures. Chapter 14, Management and Monitoring Plan provides further details.

The project will pursue the objective of 'No Net Loss' in relation to infrastructure, wherever feasible. This means that the project will aim to result in 'No Net Loss' in the quality, quantity, or availability of existing local infrastructure, where this will impact adversely on ability of communities to undertake subsistence or economic activities or reduce access to education, health or other emergency services.

11.5.2.1 General Construction Mitigation Measures

The overall approach to management of potential impacts on infrastructure and resources is as follows:

- All construction activities will take place within agreed areas
- Construction techniques will be used to minimise disruption to infrastructure and services. Examples of these measures have been identified in the project description (e.g. trenchless crossing of busy roads (via Auger bore or Pipe Jack). Others are identified in the following sections. The contractors will have the freedom to suggest alternative or additional measures, but will be required to demonstrate that these measures will achieve the mitigation objectives as effectively as those specified in this ESIA.
- A crossing schedule including all known roads, telephone and electricity facilities and oil, gas and water pipes has been prepared and will be given to the selected construction contractor. The contractor is expected to cross these in agreement with owners and without damage. During construction the contractor will be aware of the potential for un-identified services and structures and will take care to avoid any damage – there will be no planned disruption to services. The Contractor will be required to repair any damage caused.
- Where there will be planned diversion to infrastructure or services, this will be identified by the contractors in advance as far as possible. All planned diversion will be communicated to local authorities at least 3 days in advance and also to communities through pre-construction meetings (see Section 11.6, Community Relations). The timing and duration of the diversion will be agreed. Where infrastructure is to be impacted, the timetable for repair of the infrastructure will be agreed with the authorities and the communities. Should the diversion be judged by the affected party to result in loss in livelihood, the validity of the claim and necessary compensation will be determined as described by compensation procedures in the Resettlement Action Plan (see Section 11.4).
- Should infrastructure or services be disrupted accidentally, the authorities of the affected communities will be informed of the reason for the disruption and the contractor will work with the service owner to effect repair in the shortest time possible. Within 1 day, written information will be provided to the village executive (or the district centres) providing details of the disruption, of alternative measures (if appropriate) and any measures that will be taken to assess any damage caused as a result of the disruption. The Community Liaison Officer will ensure that there is an announcement in public places and that notices are posted on the community notice board, such that the local residents are informed of the disruption.
- The contractor is responsible for maintenance on all work undertaken as part of the contract for 2 years following the completion of the pipeline.

The measures outlined in Table 11-5 below relate to specific issues as follows:

- I1: New roads
- I2: Upgrades and Damage to existing roads
- I3: Roads: Increase in traffic and traffic-related accidents
- I4: Road Access
- I5: Access restrictions
- I6: Open trench
- I7: Electricity and Power: Depletion of local electricity supply due to electricity use during construction

- I8: Electricity and Power: Depletion of local electricity supply due to electricity use during operation
- I9: Water: Increased pressure on water resources for construction activities, camps and AGIs
- I10: Water: Damage to community water supplies
- I11: Sewage and Waste Disposal: Increased Waste
- I12: Telecomm: Congestion of network
- I13: Extraction of Aggregates
- I14: Education

Table 11-5 Impacts and Mitigation Measures: Local Infrastructure, Services and Natural Resources Issues

Issue No	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
I1	<p>New roads</p> <p>The project may require some new roads not constructed for the BTC project to reach block or check valve stations. Many communities anticipate that this will result in a positive impact due to the need to upgrade existing roads and build new roads, which will remain for community use following the completion of construction.</p> <p>The base case is that all new roads not required during operation will be removed at the end of the construction period.</p>	<p>The construction contractor will be required to consult with communities and landowners before building any new roads. In addition, many of the communities close to potential access roads who are also within 2km of the pipeline route or 5km of a construction camp or pipe yard have been consulted during the ESIA process.</p> <p>Following construction, communities will be able to make a case to keep any new roads not in ecologically sensitive areas. The SCP Partners will consider requests on a case-by-case basis, in consultation with authorities and specific landowners impacted and taking into account the land acquisition impacts.</p>	New roads: beneficial

Issue No	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
I2	<p>Upgrades and Damage to existing roads</p> <p>Despite extensive use of the ROW as an access road, there will be use of existing major and minor roads to access the route. While the majority of roads are already in a very poor condition, there is a community concern that these roads will be damaged further by construction activities, and left in a worse condition than prior to work beginning. This would be of major concern, given the poor state of roads at present and the importance placed on the transport network by communities. The conditions of roads has been one of the most important community issues for the WREP.</p>	<p>The construction contractor will be required to document the initial condition of all roads before the commencement of the BTC construction period. This documentation will include photographic evidence and will be agreed with the community and authorities in advance. The construction contractor will be required to maintain roads to a reasonable standard throughout the period they are used for construction and to ensure that all roads used are left in a condition at least as good as found on completion of the work.</p>	<p>Improvement to roads: Beneficial</p>
I3	<p>Roads: Increase in traffic and traffic-related accidents</p> <p>There will be an increase in traffic on all the roads used for construction. On some roads, particularly smaller access roads passing through communities, this is likely to be more significant (See 12.2.7). The duration of this impact will be short-medium term in any one place given the pace at which the spreads will move. This will result in increased nuisance and general disturbance for communities as well as higher safety</p>	<p>Traffic safety is a high priority for the SCP project. The project will seek to minimise the amount of traffic through communities, the distance travelled by individuals carrying out the work and the distances over which equipment will need to be transported by road, through maximum use of the rail network</p> <p>The construction contractor will have developed a Traffic Management Plan for BTC. The plan will take into account routes, speeds, times of travel, key roads in terms of local services and delivery of goods to market and measures to be taken to limit impacts on these key</p>	<p>Increase in traffic and traffic related incidences: high</p>

Issue No	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
	<p>risks for both people and animals.</p> <p>However some community members are likely to see an increase in traffic in their areas as a positive impact that provides more economic opportunities such as roadside stalls.</p>	<p>roads. Likely impacts on schools and major pedestrian crossing areas will also be assessed and necessary measures identified. The plan will be reviewed following the BTC construction period and any amendments finalised in agreement with the SCP Partners.</p> <p>The plan must also be aligned with the BP safe driving rules. These include a maximum speed limit of 80km/hour on open road and 40 km/hour in residential areas, and night driving only when subject to justification and risk assessment.</p> <p>Construction contractors will also be required to provide defensive driving training to relevant workers to ensure a high standard of project driving.</p> <p>The Transport Management Plan will include a programme of traffic safety awareness raising in villages affected by traffic. This activity will be carried out by the Community Liaison team (See Section 11.6)</p>	<p>Economic Benefit (road-side stalls): beneficial</p>
I4	<p>Road Access</p> <p>There may be some temporary or partial road closures required during crossings. Only secondary roads and tracks will be open cut and therefore require diversions. Access along main roads will be maintained. The average time a road is cut for a crossing is 2 days, but will frequently be shorter.</p>	<p>The Community liaison team will inform communities in advance if/when road closures are required, and diversions will be properly signposted. Alternative access routes will always be available. This would include existing alternative roads as well as any routes specifically constructed by the contractor.</p> <p>Alternatively, the road crossing may be constructed in sections, so that only half the road is closed at one time.</p>	<p>Road access: low.</p>

Issue No	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
15	<p>Access restrictions</p> <p>During the construction phase open trenches and other construction work will limit access along or across the ROW. This will hinder access to grazing land or fields under cultivation. It may also hinder access to schools, markets etc. The scale of impact will depend on the location of the crossing, the ability to identify convenient alternative crossing points, and the length of time the trench is open at these locations.</p>	<p>The ROW will be clearly demarcated. The contractor, with assistance of community liaison team, will be responsible for identifying the need for crossing points, and reaching agreement with landowners, land users (including migratory herders) and communities on the most appropriate quantities and locations to ensure that disruption is minimised. Crossing points must be safe, clearly visible and illuminated where necessary.</p> <p>All crossings of tracks and roads will be re-instated on completion of activities.</p>	<p>Access restrictions due to open trench: low</p>

Issue No	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
I6	<p>Open trench</p> <p>The pipeline corridor will contain an open trench, averaging 2.4 meters deep, heavy machinery and spoil. See Section 5, Figure 5-12, for an illustration of an open trench.</p> <p>Although only construction personnel will be permitted to enter the working corridor of 44 metres, there is the possibility that community members and animals will nonetheless gain access to the ROW and trench. Danger will be increased at night.</p> <p>It is possible that livestock will fall into open trench.</p>	<p>The amount of trench open at any one time will be limited to 10 km of continuous trench or 15 km of non-continuous trench.</p> <p>Fences will be used close to occupied properties or sensitive areas where this is deemed the most appropriate mechanism to assure safety of people, livestock and property. Fencing and illumination will be used all trench crossing points.</p> <p>Stockproof fencing will be erected in areas of danger for livestock. The Community liaison team will agree areas for fencing with relevant communities and livestock owners in advance of construction activities.</p> <p>Community Liaison teams will provide safety briefings during their meetings in every community along the route prior to construction. This will include information on road safety and also an explanation of the hazards posed by the construction activities. Briefings will also be provided to groups outside formal settlements, but within two kilometres of the construction ROW, including herder communities.</p> <p>In addition to this, watchmen will be employed to monitor the trench and the night-time vehicle storage areas to discourage public infringement onto the ROW.</p>	<p>Accidents involving community members: high but unlikely</p> <p>Accidents on open trench involving livestock: medium</p>

Issue No	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
17	<p>Electricity and Power: Depletion of local electricity supply due to electricity use during construction</p> <p>Any reductions in local community access to power will have a negative impact, given the current supply problems and concern among communities about access to power. The impact may be real, but there is also likely to be an issue of perception if the project is seen as further reducing the power supply available to households.</p> <p>The geographical distribution of any effects of a drain on domestic power supply depends upon how the national grid prioritises distribution in response to supply problems. Should this impact be significant, the distribution of this effect could be determined through discussion with domestic energy providers. Given that most power needs for the project will be filled through self-generation, it is not anticipated that it will be a major issue.</p> <p>The amount and therefore the effect of the power drawn from the rail grid to transport pipe and other materials is unknown at this stage.</p>	<p>Even though the ITT allows the contractor to draw from public electricity supplies if this would not adversely impact the public, it is probable that there will be self-generation (using diesel) of power at construction camps, pipe yards.</p> <p>Transparency If complaints are raised that the project's energy draw is having a negative impact on community access to power, the SCP Partners will provide information on monthly power to individuals or organisations requesting it.</p>	<p>Electricity and Power use depleting supply to communities: medium - high (depending on whether camps will draw from the local electricity network and the amount of electricity used for rail transportation)</p> <p>Economic benefits from local purchase of diesel to use in power generation: beneficial</p> <p>The project's payments for any local network electricity used will potentially benefit regional power supply as cash will be injected into the local energy network, enabling increased expenditure on upgrade of the domestic system.</p> <p>Communities in the vicinity of facilities may well benefit from the projects demands for reliable supplies.</p>

Issue No	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
	Additional perceived negative impacts are likely to be encountered where villages with no/minimal access to power are close to facilities where access to power will be continuous.	CLOs will liaise with communities to address concerns that may arise over the absence of any positive benefits in relation to access to energy.	
18	<p>Electricity and Power: Depletion of local electricity supply due to electricity use during operation</p> <p>There will be self-generation (using diesel or gas) of power at pump and pigging stations and therefore no negative impact on the availability of power to communities.</p> <p>During operation if the pipeline was to use its peak requirements (27.5 kilowatts) constantly for a year, this would equate to the annual power consumption of approximately 120 Azerbaijanis, ie less than .01% of the population and can be regarded as minimal. However the effect of the draw on local distribution is currently unknown.</p> <p>Additional perceived negative impacts are likely to be encountered where villages with no/minimal access to power are close to the large AGIs where power supply is continual.</p>	<p>No mitigation measures have been designed to off-set any electricity drawn from grid to power block and check valves during operations as impact considered minimal.</p> <p>Transparency If complaints are raised that the project's energy draw is having a negative impact on community access to power, the SCP Partners will provide information on monthly power to individuals or organisations requesting it.</p>	Electricity and Power use depleting supply to communities: low

Issue No	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
19	<p>Water: Increased pressure on water resources for construction activities, camps and AGIs</p> <p>Most communities experience difficulties in getting sufficient clean water for either domestic or agricultural use. The primary constraint is the absence / poor quality of water pipes and pumps but water scarcity is also an issue. Hence, water used by the project could result in shortages in local communities, who use these sources for irrigation, domestic uses and livestock watering.</p> <p>In such locations, there is additional risk of a perceived impact if construction camps and sites are seen to have access to fresh water while villages do not.</p>	<p>This impact will be eliminated by identification of water sources for project use during BTC Construction that do not affect the amount of water required for local use. Communities who use the same water source as the project will be routinely consulted to understand whether there has been any negative impact on their access to water and project water draws adjusted as appropriate. Suitable sources that are acceptable to local communities should be confirmed before the commencement of SCP construction.</p> <p>Large volumes of water will be required for hydro-testing and therefore only very substantial sources may be used. The total volume of water used for hydrotesting is not expected to have a social impact, as sources will be carefully selected. Appropriate approvals will be sought from the regulators for hydrotest water abstraction.</p> <p>It is likely that drinking water at the camps and on the construction sites will be bottled, so there will be no use of local sources for drinking.</p>	<p>Community access to water restricted for a short duration: medium</p> <p>Perception of inequity in water resources: medium</p> <p>Economic benefit from supply of bottled water if locally supplied: beneficial</p>
110	<p>Water: Damage to community water supplies</p> <p>30% of villages have constant communal water supply, while 50% never receive communal water. Many</p>	<p>Sediment control measures will be used on all river crossings and where water that is used for drinking is disrupted by construction activities. Where access to</p>	<p>Pollution of community water sources during operation: medium</p>

Issue No	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
	<p>communities often drink river or canal water. These are frequently already polluted, resulting in public health problems. Construction activities around waterways and river crossings could result in high levels of sediment in water sources used by communities for drinking purposes and render them even less suitable for human consumption, requiring settling to remove the sediment. The presence of sediment would also make the water less usable for agricultural and other domestic uses besides drinking.</p>	<p>drinking water sources is halted by construction, alternative sources of supply will be provided to communities during the period of disruption.</p> <p>The pipeline design has specifically incorporated features to address the main causes of a pipeline leak, including third party interference, geohazards, corrosion etc</p> <p>See section 10.4 for a description of the risk assessment procedures.</p>	
I11	<p>Sewage and Waste Disposal: Increased Waste</p> <p>Given that there are no waste or landfill sites in Azerbaijan that meet the international standards specified by either BTC Co or the SCP Partners, it is probable that a landfill will need to be created. Sites have yet to be identified. Hence an analysis of the social impacts of these sites has not been completed as part of this ESIA process.</p> <p>Communities do not consider waste disposal a serious issue. This is probably because other issues are seen as far more significant. However consultation will be required with communities located adjacent to</p>	<p>Sites will have been established for the BTC project and these will be used for SCP as well.</p> <p>The volume sent to waste management sites will be minimised by re-use, recycling and incineration where possible. See Section 10, Environmental Impacts and Mitigation, for the standards required on generation of smoke.</p> <p>Section 5, Project Description, contains a description of the anticipated types and volumes of wastes arising as a result of the project.</p>	<p>Visual and health nuisance from smoke generated by incineration of waste: low</p>

Issue No	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
	<p>proposed waste disposal sites. While the magnitude of any negative social impact related to a waste management site may be low and the impact localized, the duration will be long-term and the impact could be high if the site is badly located.</p> <p>Area of Impact: concentrated in villages around waste disposal sites.</p>		
I12	<p>Telecomm: Congestion of network</p> <p>The mobile network will receive high usage during the construction process by project personnel. Fixed networks may also be used wherever they are available. Fixed and mobile infrastructures are not well developed and have been implemented for low demand. However the impact of project usage on local communities will be negligible. Only around 0.5% of those surveyed have mobile phones. 40% of villages have no access to phones or only have phones at communal points.</p> <p>For the operational phase, the use of the fibre optic cable will result in minimum impact on the existing land-line network. There will be some use of mobile phones during operation. However, this is expected to have a</p>	<p>Discussions are being held with the fixed line and mobile network providers to inform them of the project activities and likely demand for services.</p>	<p>Congestion of networks: low</p> <p>Improved telecoms network as a direct result of the project: beneficial</p>

Issue No	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
	limited impact given the small number of staff required for this phase.		
113	<p>Extraction of Aggregates</p> <p>The extraction of aggregates from local borrow pits will have positive social benefits in terms of economic impact for local aggregate businesses, as long as aggregate demand from the construction contractor does not restrict local access for other purposes.</p> <p>There will also be an increased noise, dust and visual impact from increased aggregate extraction, however the project is not expected to require large quantities of aggregate and this is therefore unlikely to be a significant impact.</p>	<p>The ITT has specified that construction contractors should aim to use local aggregate extraction sources. It also specifies that the contractor will need to undertake an environmental and social assessment prior to extraction.</p>	<p>Economic benefit from supply of aggregate: beneficial</p> <p>Limiting availability of supplies: low</p>

Issue No	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
114	<p>Education</p> <p>There will be no direct impacts on educational infrastructure, as all construction workers will be employed on a single status basis. Nevertheless there are a number of potential secondary impacts in this respect:</p> <ul style="list-style-type: none"> • In-migration into the project area resulting in increased pressure on schools. This is not anticipated to occur to a significant extent, as in-migration will be strongly discouraged by the project. (See section 11.6, C1) • Children of school age may replace parents with temporary construction jobs in the “family work” such as farming, animal husbandry or looking after family members. Children of school age already undertake some unpaid family work in busy agricultural seasons, particularly at harvest time. Given the existing high levels of adult unemployment and that most jobs are likely to be short term, it is not expected to be a common occurrence. 	None required.	None.

11.6 COMMUNITY RELATIONS, MANAGEMENT OF CONSTRUCTION WORKERS AND CAMPS

Despite maximising local employment throughout the construction phase of the pipeline, up to 750 either foreign workers or workers who are not local to the pipeline affected communities may be required. Influxes of foreign and non-local workers based in construction camps can have a major impact on local communities, as well as attracting additional migration of people seeking economic opportunities into an area. Hence, the management of the camps themselves, and the management of community relations in connection with the camp and other construction issues is of critical importance to minimising potential impacts of the project.

This section sets out not only specific measures related to the management of the influx of foreign workers and of the construction camps, but also addresses community relations management plans in regard to the pipeline project as a whole. The community consultation process indicates that the vast majority of communities regard interaction with construction workers positively, primarily due to potential economic benefits. However there is also awareness that some issues will need to be managed carefully to avoid negative impacts that could give rise to conflicts between workers and local people.

The majority of the measures outlined here relate to the construction phase, and will be implemented by the contractor. Many of these measures have been included in the ITTs for construction of the pipeline. They will be developed in more detail in management plans for community relations and construction camps that will be reviewed and finalised with the SCP Partners. community relations team during contractor negotiations and prior to the start of construction activity. SCP Partners. will be responsible for implementing measures in the operational phase.

11.6.1 Aspects of the project giving rise to Impacts on Community Relations

The various impacts relating to relationships between the construction workers and local communities are centred on the construction camps and the construction sites and spreads themselves, to and from which workers will be transported on a daily basis. A number of construction camps are anticipated in Azerbaijan, with potential sites identified close to Mugan¹⁰, Kurdemir¹¹, Ganja¹² and Poylu¹³. The final number and location of construction camps will be determined by the construction contractor, and it is unlikely that all of the camps will be operating at the same time.

Each permanent camp will measure approximately 500m x 500m and will have the capacity to accommodate up to 1400 construction personnel. The camps will be open in the sense that workers will generally be free to come and go, and to interact with the local communities in

¹⁰ KP 63

¹¹ KP 128-132

¹² KP 297-302

¹³ KP 410

their leisure time. However there will be some restrictions on these freedoms such as after hours limits on movement outside the camps. In addition full recreational facilities will also be provided within the camps to minimise the need for finding recreation in the local community. The camps will generally hold skilled and semi-skilled workers, who will be employed for significant periods of the construction phase.

There will also be interaction between communities and construction work teams along the pipeline route, and at pipe yards¹⁴.

Section 9.9.4 sets out the results of community consultation at each of the proposed locations for construction camps and pipe yards. Any other sites for construction camps will be subject to further environmental and social assessment, in line with regulatory requirements before approval by local authorities. This will be the responsibility of the construction contractors.

11.6.2 Identification of Impacts

Table 11-6 below lists the impacts, measures and residual impacts associated with these issues, and with the overall community relations process. The residual impacts are discussed further in Section 12.3. The community relations programme is designed to assist in the management of issues affecting communities that have been described earlier, in Sections 11.3 (impact on land and land-based livelihoods), Section 11.5 (impact on infrastructure, services and natural resources).

The impacts that are discussed in Table 11-6 are as follows:

- C1: In migration
- C2: Tension between communities and workers
- C3: Damage to local land and property
- C4: Crime & Violence arising from Drugs and alcohol
- C5: Spread of communicable diseases to communities along pipeline route
- C6: Health Provision
- C7: Positive social interaction
- C8: Community Relations – general measures
- C9: Complaints Procedure - general measure
- C10: Community Relations – General measures

¹⁴ The following potential pipe yard sites were reviewed under the ESIA process: Sangachal (Umbaki) KP 2, Mugan, KP 63, Kurdemir KP128-132, Udjar KP 175-177, Leki KP 205, Guvekend KP 205, Yevlah KP 231, Ganja KP 297-302, Deller KP 340, Zeyem KP 354, Puylu, KP 410, Boyuk Kesik KP 440. Further sites as Kazi Magomed, and Baku have since also been identified.

Table 11-6 Impacts and Mitigation Measures: Construction Personnel and Community Relations

ISSUE NO	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
	CONSTRUCTION		
C1	<p>In migration</p> <p>Experience shows that it is highly likely that people will be attracted to areas around construction activities seeking to sell goods and services ranging from food to prostitution. This could cause tension with local communities, limit opportunities for local businesses, lead to the establishment of informal settlements in the vicinity of the project area, increase competition for public services and resources, and increase the potential for the spread of diseases and illegal activities including drugs use. This is less likely to be an issue for SCP given that the BTC mitigation measures should have already discouraged most in-migration.</p> <p>Areas of Impact: This would be most likely to occur in the vicinity of construction camps, i.e. Mugan, Kurdemir, Ganja, and Poylu.</p>	<p>In migration in search of employment opportunities will be actively discouraged by the construction contractor and the SCP Partners. through implementing and publicising the recruitment strategy outlined in section 11.4 as early as possible. This gives preference to candidates from pipeline affected communities and specific job descriptions for semi-skilled and skilled work (see section 11.4).</p> <p>Recruitment will only take place at designated centres and not via informal requests or approaches from community members either at construction camps or on the route.</p> <p>The construction contractor will publicise the fact that no goods needed for the project will be purchased informally at camp locations or work sites, but instead through formal contracts with suppliers. Informal settlements close to camp boundaries will be reported to the relevant authorities.</p>	In-migration: medium

ISSUE NO	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
C2	<p>Tension between communities and workers Cultural differences, behaviour by construction workers, potential breaking of local cultural norms, potential for prostitution, and the attraction of 'hangers on' at camp sites could lead to increased tension between local communities and the workers and camps. The scale of this impact will depend on successful implementation of mitigation measures, and in part also on the origin of the workforce staying in construction camps ¹⁵.</p>	<p>Overall Management of Construction Workers</p> <p>The employment policies defined in Section 11.3 above to maximise job opportunities for local people will help to minimise tensions caused by different socio-cultural values.</p> <p>Training will be provided to all staff, both national and expatriate, on camp management rules and overall discipline and cultural awareness. This will include:</p> <ul style="list-style-type: none"> • a briefing on Camp Rules • a community relations orientation. The objective of this orientation will be to increase awareness about the local area, cultural sensitivities and the Code of Conduct • awareness raising on health considerations, including communicable diseases. <p>The construction contractor is required in the pipeline ITT to develop a Construction Camp Management Plan to address:</p> <ul style="list-style-type: none"> • Discipline • Community liaison • Ethnic tensions • Market distortion (<i>see employment and local sourcing mitigation</i>) and • Communicable diseases 	<p>Tension between communities, workers and the project: medium.</p>

(1) Semi-skilled and skilled workers will be housed in the construction camps. Unskilled workers will generally be sourced from the local communities and will therefore not require housing.

ISSUE NO	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
		<p>A Code of Conduct and Camp Rules will be required within the Construction Camp Management Plan. These will include the following:</p> <ul style="list-style-type: none"> • limits on hours of movement outside of camps • no access to camps by non-authorized personnel and use of security passes for workers • zero tolerance of illegal activities including use of illegal drugs by construction personnel • no hunting, fishing or unauthorized gathering • zero tolerance of bribery or requesting gifts from communities. Any "gifts" to be immediately reported. This policy must be in line with the BP's policy on Ethical Conduct • no use of camp vehicles for non-work business • no use of personal vehicles for work business (safety and liability issues) • a strict policy with respect to alcohol consumption • rules on access to, and use of camp entertainment facilities if these are to be opened up to neighbouring communities 	
C3	<p>Damage to local land and property</p> <p>Lack of control over the movements of construction staff (during and after working hours) could result in trespassing and damage to local land and property. This lack of control could also result in residents feeling</p>	<p>The general mitigation measures outlined above for C2 will help to manage the behaviour of workers and minimise the likelihood of this impact.</p>	<p>Tension between communities, workers and the project: medium.</p>

ISSUE NO	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
	vulnerable to the behaviour of construction personnel as well as create a sense of their privacy being invaded. Such reactions will however depend on the on-going behaviour of construction staff and the extent to which local residents feel comfortable about their presence.		
C4	<p>Crime & Violence arising from Drugs and alcohol</p> <p>There is a possibility of some incidents of construction workers obtaining and consuming illegal substances and/or excessive amounts of alcohol in communities along the route. This can have a negative impact on communities by increasing incidents of crime and/or violence and threats to the safety of community members.</p> <p>Most likely to be an issue in villages nearest to construction camps, i.e. Mugan, Kurdemir, Ganja, Poylu</p>	<p>Limited quantities of alcohol will be available to workers within the camps, to discourage them from seeking alcohol outside the camps. The contractor will be required to have a programme for drug and alcohol abuse prevention and random testing that is equivalent in scope and objectives to the . Drug and Alcohol Abuse policy. There will be a zero tolerance policy of drunkenness on the ROW.</p> <p>As part of the community relations plan, the Code of Conduct will be publicised in settlements potentially affected by the construction camps. This will help ensure that the local residents are aware of the expected behaviour of construction staff. Posters with the Camp Rules will also be posted in neighbouring settlements.</p> <p>Construction camps will provide entertainment facilities for workers to encourage them to remain within the camp boundaries during leisure time.</p>	Tension between communities, workers and the project: medium.

ISSUE NO	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
C5	<p>Spread of communicable diseases to communities along pipeline route</p> <p>There is a strong likelihood that there will be prostitution associated with camps, as is common for all large construction projects. This carries a risk of the spread of communicable diseases, either to workers on the project or to the prostitutes that move into these areas. <i>(See Section 9.7.6 for information on communicable diseases in Azerbaijan)</i></p> <p>There is also a risk that the existence of the construction workers and their interaction with the local communities might either introduce new diseases to the country or the region, or might significantly increase the rate of transfer from one community to another.</p> <p>Villages nearest to construction camps will be most affected, i.e. close to Mugan, Kurdemir, Ganja, and Poylu.</p>	<p>The Construction Contractor will operate a personal health programme in order to prevent illness or disease occurring or spreading, including immunisations if required.</p> <p>The SCP Partners will develop a community outreach programme on communicable diseases, eg HIV/AIDS. This is likely to be in partnership with a local expert NGO.</p> <p>The construction contraction is require to provide:</p> <ul style="list-style-type: none"> • Health awareness training for workers including communicable diseases at induction and then periodically throughout construction. • Awareness raising on communicable diseases for communities close to camps (via posters, leaflets, through health clinics, community meetings). • liaison with local medical authorities 	<p>Increase in diseases: medium</p> <p>Improved health awareness: beneficial</p>

ISSUE NO	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
C6	<p>Health Provision</p> <p>There is a risk of a perceived indirect negative impact of increased resentment towards the project and project team where communities see that construction workers are provided with superior health facilities to which the community has no access. This will also increase frustration at the poverty of the services available to them.</p>	<p>Medical facilities within camps will not be made available to local communities in general. However, workers, including local workers, will be able to use the project's medical facilities and this will reduce demand on the existing community health services for the duration of construction in each community's area.</p> <p>The community investment programme, discussed in Section 13.5.1.39, may involve projects to improve local health care infrastructure.</p>	<p>Perceived inequity in health provision: medium</p>
C7	<p>Positive social interaction</p> <p>Interaction between workers and communities can be a positive benefit, bringing information and ideas to relatively isolated communities.</p> <p>However, the mitigation measures defined above that are required to counteract the negative impacts of construction workers in the area may limit the scale of this positive impact.</p>	<p>None, beyond community relations induction listed above.</p> <p>Individual events may include community cultural or sporting events etc.</p>	<p>Access to new cultures and international attitudes: beneficial</p>
C8	<p>Community Relations – general measures</p> <p>There could be a cumulative negative community impact deriving from the negative impacts</p>	<p>The construction contractor will be required to submit a Community Relations Plan for review and approval by the SCP Partners. This is described in further</p>	<p>Tension between communities, workers and the project: medium.</p>

ISSUE NO	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
	<p>outlined in all sections within this Chapter. This could result in a poor and potentially hostile relationship between the community and the SCP Partners/Construction Contractor and the Construction workers.</p>	<p>detail in the Public Consultation and Disclosure Plan (PCDP), in the Appendices.</p> <p>The construction ITTs require the contractor to provide community liaison personnel who will be integrated into a joint SCP Partners/Contractor team lead by a Community Relations Manager reporting to the SCP Partners. The Community Relations Manager will be in place early enough to oversee the development of management plans and carry out community liaison in relation to preparatory construction activities.</p> <p>Community Liaison Officers employed by the construction contractor will work alongside the construction activities (ie camps, pipeline and AGI construction). The leader of this team will be in place at least 6 months before construction commences, and the full team will be in place at least two months prior to the start of pipeline or camp construction.</p> <p>For further details of the structure and roles of members of the community relations team refer to Section 5 in the PCDP annexed in Part 5 of the Technical Appendices. In addition to a community relations plan, the SCP Partners will implement a community investment programme for pipeline affected communities in order to help maintain positive relationships. This is discussed in further detail in Section 13.5.1.39.</p> <p>Selected land officers will also remain the main point of contact for communities on property and land</p>	

ISSUE NO	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
		<p>issues during construction to monitor and assist the construction contractor's pre-entry agreement procedure and final re-instatement sign-off with owners and users and for resolving outstanding issues. They will report to the Community Relations Manager that the SCP Partners plan to have in place prior to construction.</p>	
<p>C9</p>	<p>Complaints Procedure General Measure Despite mitigation measures outlined in this section and in earlier management and mitigation sections, there are likely to be incidences where community members will want to make formal complaint, e.g., to record an incident of poor worker behaviour in a community, to apply for compensation as a result of damage to property etc.</p>	<p>The Contractor will aim to minimise formal complaints through the use of community liaison mechanisms outlined above. However, a formal complaints procedure will be set up to record and address any complaints. A nominated individual (normally the Community Liaison Officer) will be provided for community members to address complaints to directly. Details of the telephone number and complaints procedure will be distributed at community meetings and via posters to all communities in the vicinity of the working area, construction camps and close to roads that will experience significant increases of traffic movements.</p> <p>The telephone will be answered in person whenever possible during working hours and recorded at all other times. Details of the complaint, source, its location and date/time of offending event must be recorded. The Contractor's Community Liaison Officer and/or the Community Relations Supervisor will investigate the complaint. The location of the community liaison team will also be widely publicised so that complaints can also be made in person.</p>	<p>Complaints procedure: beneficial The aim of these mitigation measures is to establish a legacy of trust and good relations with communities.</p>

ISSUE NO	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
		<p>The communities will also be provided with contact numbers for the SCP Partners Community Relations Manager in the event that the Contractor does not satisfactorily handle a complaint.</p> <p>The SCP Partners will respond to all complaints that are received from local community members or local authorities within two weeks at the latest. The resolution of any complaints will be dealt with as speedily as possible. Full details of the complaints procedure are contained in the PCDP in the Appendices.</p>	
	OPERATIONAL PHASE		
C10	<p>Community Relations – General measures</p> <p>A community liaison team will be required to manage community relations during the operational phase. It is not expected that day-to-day operations will create any negative community relations impacts. However communities will expect to be kept informed of activities surrounding the pipeline and failure to do this will create a small amount of hostility towards the project.</p> <p>In the event of a safety incident, the communities' information</p>	<p>Good community relations are key to the inherent security of the pipeline and this is recognised by the Project, and will be reflected in the Community Relations Plan for operations</p> <p>A community relations team will be in place during operation of the pipeline. This team will</p> <ul style="list-style-type: none"> • hold regular meetings with communities; • maintain awareness of safety issues; • monitor the pipeline route to ensure compliance with land use constraints; • provide monthly reports to the Operations Management on issues arising from community liaison; and report breaches of safety or land use constraints, or serious disputes. 	<p>No direct negative residual impact anticipated.</p> <p>Additional money injected into communities from wages: beneficial</p>

ISSUE NO	ISSUES / IMPACTS	MANAGEMENT AND MITIGATION MEASURES	RESIDUAL IMPACT (see Section 12 for a discussion of the High and Medium residual impacts)
	<p>needs will be even more important to minimise any safety related impacts (for both persons and livelihoods) and to minimise negative feelings towards the SCP Partners.</p> <p>A number of workers during the operational phase are likely to be drawn from the local communities, such as for the pipeline patrol teams that monitor the line. This will have a beneficial economic impact to both the project and to local communities through local employment while also enhancing awareness of the pipeline amongst the communities, so enhancing inherent security</p>	<p>Full details of the general community relations measures are contained in the PCDP in Part 5 of the Technical Appendices.</p>	

11.7 SAFETY AND NUISANCE IMPACTS

The community consultation process has indicated that levels of concern about safety and nuisance issues are relatively low along the whole of the proposed route. This rather surprising fact can be attributed in part to the fact that communities are not fully aware of the nature and extent of this disturbance, and also that their hope of employment on the project leads them to downplay these potential negative impacts. It is anticipated that the level of concern regarding safety and nuisance will rise once construction has commenced. In particular, while it is considered that the likelihood of a safety incident involving a community member is very low, if one indeed takes place it will have a significant negative impact on the community itself and on community attitudes towards the project

Most of these issues covered in Chapter 10, Assessment of Potential Environmental Impacts:

- 10.3.3: Air quality (including dust)
- 10.3.4: Noise
- 10.3.10: Landscape and Land-use (including visual impacts)

The remaining safety and nuisance mitigation measures without an environmental facet have been integrated into others areas of Section 11 as follows:

- 11.4 I5: Access Restrictions
- 11.4 I6: Open Trench

RESIDUAL IMPACTS

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12 RESIDUAL IMPACTS

12.1 Introduction

Sections 10, Environmental Impacts and Mitigation, and 11, Social Impacts and Mitigation described the potential impacts that would occur along the route as a result of different phases of the project and how the proposed mitigation measures would contribute to minimising or eliminating the impacts. As discussed, not all impacts can be fully mitigated and residual effects will be experienced by the environmental and social receptors affected by the project.

This Section discusses and summarises the potentially significant environmental and social residual impacts of the SCP project, ie those identified as **High** or **Medium** in Sections 10 and 11. Residual impacts are the effects that will, or may arise as a consequence of the project after implementation of the mitigation measures. Where necessary, this Section identifies activities that will determine the nature or extent of particular residual impacts that are not yet fully defined. The management plans outlined in Section 14, Management and Monitoring have been designed to ensure effective implementation of the mitigation measures. The monitoring plans outlined in Section 14 have been designed as a mechanism to record whether the mitigation measures are being correctly implemented and are working effectively.

The methodology used for defining the significance of each residual impact is provided in Section 7. It should be noted that a classification of High or Medium does not necessarily imply a large scale potential impact.

The objective of this Section are to:

- detail the **Medium** and **High** significance residual impacts
- describe why it has not been possible to mitigate these **Medium** and **High** residual impacts
- outline programmes for providing offset benefits in relation to these residual impacts

12.2 Environmental Residual Impacts

12.2.1 Introduction

This Section summarises the residual environmental impacts as:

- **High** (H) or **Medium** (M) significance
- **Unknown** (U)
- **Beneficial** (B)

It should be noted that the designation of **High** and **Medium** rankings to unplanned events (ie a pipeline rupture) is subjective, but based on experience and professional judgement. The strict application of the severity/consequence tables in Section 7.9.4 is not considered appropriate for unplanned events which will vary in magnitude and consequence depending on the location, size and duration of the event.

Following completion of the initial environmental impact assessment, a constructability review was undertaken by a multi-disciplinary team at many of the locations associated with residual impacts scored as **Medium** or **High**. The review included an assessment of alternative measures for these sites, to reduce the level of the residual impact. Alternative measures assessed included:

- different crossing techniques for rivers
- a reduced ROW in some short sections
- reduced separation distance between SCP and BTC pipelines in some locations
- the possibility of dual laying specific sections of the SCP and BTC pipelines

The results of this review have been incorporated into the mitigation measures described in Section 10 and are discussed in more detail in this Section.

12.2.2 Ecology

12.2.2.1 Habitats

The IFC's Natural Habitats Policy (OP 4.04) includes measures to protect 'critical natural habitats'. Critical natural habitats are defined as including areas proposed by Governments as protected areas. It is therefore necessary to consider potential impacts on the proposed Gobustan State National Park in the context of the Natural Habitats Policy. The policy requires project sponsors to avoid critical natural habitats. Only if this is not possible should impacts be reduced by the application of direct mitigation measures and the provision of offset compensation.

The extensive nature of the Gobustan desert and the proposed Gobustan State National Park, and their proximity and position substantially surrounding the Sangachal Terminal, means that it is not possible to completely avoid these areas with any pipeline route from the Terminal. In accordance with the IFC's Natural Habitats Policy (OP 4.04) alternative routes have been considered (Section 4, Project Alternatives) and the shortest route has been taken across the proposed State National Park. 9km of the pipeline route is within the proposed Gobustan State National Park area (KP19.5 and 28.5) and a further 19.5km (KP0-19.5) through non-designated, but botanically sensitive, desert habitat. It is also relevant to note that the areas crossed by the pipeline route are significantly degraded due to human activity, traffic, other infrastructure (eg existing pipelines), farmsteads, and military use.

The mitigation measures outlined in Section 10 will considerably reduce impacts on the habitats and soils of the desert, but the residual impact on the Gobustan desert habitat is classified as **High** as it is expected to take over 10 years to fully reinstate.

In order to minimise the impact on the Gobustan desert, various alternative working methods have been considered, including:

- topsoil stripping the entire ROW, storing the topsoil and then reinstating
- only removing topsoil from the trenchline and running vehicles direct on the existing vegetation

For the section between KP5 and 27, the second alternative is proposed because:

- it allows a reduction in the ROW and therefore the extent of habitat disturbance

- the topsoil horizon containing the seed bank is particularly thin in this area, so it reduces the risk of topsoil and subsoil mixing and therefore dilution of the seedbank
- it reduces the risk of wind erosion which would also deplete the seedbank.

From KP27 to KP28.3 (the edge of the proposed Gobustan State National Park) the ROW will be dictated by the definition of a safe working platform along the mud volcano ridge. This is still being evaluated but is likely to be similar to that proposed for KP5–27.

After installation of the pipeline the ground will be lightly scarified. Revegetation will be primarily by germination of indigenous seeds entrained in the topsoil, but may be supplemented by seeding with locally sourced material. A specialist in the reinstatement of arid environments is currently evaluating potential seed sources, application methods and sowing rates. Information from this study will be supplied to the construction contractor and will be incorporated into the detailed reinstatement plan for Gobustan.

The recovery of the Gobustan desert habitat will be monitored during the operations phase until fully reinstated. Corrective action will be taken as necessary to ensure that the developing flora reflects undisturbed adjacent areas and is not dominated by ruderal species.

In addition to the above direct mitigation measures, in order to meet the ‘no net loss’ principle SCP Partners have developed an Environmental Investment Programme (EIP) as discussed in Section 13, Cumulative Impacts. Wherever possible, the EIP will go further than mitigating adverse effects and has the dual objectives of maintaining or, where desirable, enhancing biodiversity and the provision of environmental additionality. The restoration of an area of semi-desert habitat is under consideration as part of the EIP and would offset the temporary habitat loss within Gobustan.

12.2.2.2 Spur-thighed tortoise

Further field surveys are currently under way (April 2002) to identify the precise location of tortoise burrows in relation to the pipeline works. A translocation plan will be developed in conjunction with Institute of Zoology and other organisations and implemented before construction in these areas. At the identified locations an ecologist will be on site during construction to provide ongoing advice about tortoise management and to assist with animal recovery, if any are found within the ROW. If fully successful, the impact on the spur-thighed tortoise population will be **Low**. However, dependent upon the season that construction occurs in these areas there is a residual risk that hibernating tortoises may be disturbed by grading activities. It is also recognised that there is a mortality risk attached to moving tortoises to safety. Because of these risks, and the sensitivity of the species, the overall potential impact on the spur-thighed tortoise is classified as **Medium**.

A spur-thighed tortoise augmentation programme is under development as part of the ACG upstream development and is described in the EIP, Section 13, Cumulative Impacts. This conservation programme includes a captive breeding effort with the objective of breeding the animals and subsequently releasing reared individuals to the wild, thereby adding to currently viable populations in Azerbaijan. The EIP is being developed and implemented with the assistance of specialists with previous experience of conducting such programmes. The spur-thighed tortoise was highlighted among the red-listed fauna identified in the project activity area, because:

- the species is nationally and internationally protected (red-listed)

- the species is included in International conventions such as the Convention on the International Trade of Endangered Species (CITES), to which Azerbaijan is a signatory
- individuals of the species are considered to be most vulnerable to, and unable to avoid, direct construction impacts
- the hibernation pattern of the species makes it particularly vulnerable to excavation activities during construction

Azerbaijani scientists and NGOs will be closely involved with the development of this programme and local educational institutions will be included in the programmes implementation. This conservation program is meant not only to educate people regarding this species, but also to introduce conservation in general and in practice to the pipeline corridor area and beyond.

12.2.2.3 Glabrose liquorice

Wherever possible, glabrose liquorice (*Glycyrrhiza glabra*) will be translocated from the area of pipeline construction to a suitable receiving site and subsequently replaced once ground profiles have been reinstated. However, it may not be practical to undertake mitigation measures for each recorded location. In this case, the largest affected populations will be determined and sufficient specimens will be translocated to ensure that there is no long term effect on the population size. With this approach there will therefore be a short term **Medium** impact on the population, but assuming establishment is successful, there will be **No** long term impact.

12.2.3 Landscape

At the locations along the route where extensive grading is required to provide a level working area, the residual impact of pipeline construction on topography is classified as **High** as it is a permanent change. This particularly applies to the Mud Volcano Ridge area (KP26–28), the approaches to the Tovuzchay and Asrinchay Rivers (KP375.6–377), the approaches to the Hasansu River (KP395.9–398). The visual impact of the flattened ridges will be minimised by:

- Reducing the separation distance between the SCP and BTC pipelines (see Section 13)
- Considering dual lay of the BTC and SCP pipelines
- Considering potential visual impacts when selecting spoil disposal locations, if required
- Grading the edges of the levelled platform where practical

At these locations it will not be possible to return the topography to its pre-existing form as this may exacerbate erosion risks and would make access along the pipeline for inspection, maintenance or emergency response more difficult.

12.2.4 Archaeology

Pipeline construction has the potential to affect the archaeological record by physically damaging part or all of an archaeological monument but also offers potential benefits as discussed in Section 12.2.9.2. Evaluation of potential archaeological areas is ongoing so at this stage it is not meaningful to attach significance levels to the potential impacts on individual sites.

It is, however, relevant to note that the pipeline route cannot completely avoid the Gobustan Cultural Reserve due to its extensive nature and location adjacent to the Sangachal Terminal. The Azerbaijani Ministry of Culture has applied to UNESCO for the Gobustan Cultural Reserve to become a World Heritage Site. The application is currently under review. To minimise impacts the pipeline has been routed as close to the boundary as possible, through a relatively disturbed area and away from known locations of archaeological significance. The distance of the pipeline route across the reserve has been minimised to approximately 900m. Trial trenching will be conducted in this area to determine if there are any archaeological features present and a mitigation strategy will be developed in accordance with the Cultural Heritage Management Plan (Part 2a, Baseline Appendix).

The SCP Partners are currently discussing the possibility of working in conjunction with the Azerbaijan Ministry of Culture to develop a management plan for the Gobustan Cultural Reserve. This would result in a long term positive impact and a legacy for the future. Positive Archaeological residual impacts are discussed further in Section 12.2.9.2, Beneficial Residual Impacts.

12.2.5 Soils

12.2.5.1 Soil erosion

As discussed in Section 10, the significance of the residual impact of construction activities on soil erosion will generally be **Low** after reinstatement in accordance with the Reinstatement Plan. However certain areas crossed by the pipeline are particularly prone to erosion and any disturbance to the soils in these areas could initiate a significant increase in present erosion rates. In these areas the significance of the residual impacts can only reasonably be mitigated to a **Medium** level. Such areas are:

- certain parts of the Gobustan desert (low ridges and banks of wadis)
- narrow ridges (Mud Volcano Ridge and Hasansu River approaches)
- badland areas west of Ganja

Mitigation is proposed in line with the Reinstatement Summary Plan (Part 5, Technical Appendix). Following trench backfill and topsoil replacement, erosion matting will be installed where appropriate to provide immediate protection to the slope against erosion, prevent washing out of seeds and enhance the micro-climatic conditions in the soil for plant growth.

In order for erosion to be minimised, a uniform pattern of water infiltration into the soil needs to be obtained. This is best achieved through the establishment of a uniform cover of ground vegetation. However, in the badlands and ridge areas, it may be difficult to establish vegetation in the short term and hence keep erosion to an acceptable level.

It has not been possible to route the pipeline so that it does not cross the mud volcano ridge area, as this terrain constraint is oriented in a north-south direction. This area is particularly subject to considerable wind erosion, which could lift the edges of the erosion matting. Hydroseeding is being considered as an alternative method of stabilisation in such areas.

The ridges and badland areas generally support fragile vegetation, which may take a considerable time to re-establish following reinstatement (see discussion on Gobustan desert above). This will have the effect of reducing the stabilising effects of the root structure from the vegetation and a uniform pattern of water infiltration will be more difficult to establish.

Consideration will be given to various native seed mixes to determine which may re-colonise these areas most effectively and provide the most efficient erosion prevention.

SCP construction in the same corridor as BTC potentially exacerbates the potential for soil erosion on the narrow ridges and badland areas as the period of disturbance is prolonged. This cumulative impact will, however, be reduced at the Mud Volcano Ridge by the installation of both the BTC pipeline and SCP at the same time. Once reinstatement of this ridge is complete all further construction traffic will be diverted around the completed section, in order to aid rapid restoration and minimise erosion. In order to minimise the impacts upon the ridge a reduced separation distance between the BTC pipeline and SCP will be adopted.

Consideration is also being given to dual lay (laying both pipelines at the same time) at the Hasansu river crossing and at the ridges approaching the Azrinchay.

12.2.5.2 Topsoil degradation

The residual impact of topsoil degradation in the Gobustan region is considered to be **Medium**. Vehicle movements and clearance due to initial grading of the ROW will disturb the thin topsoil and seed bank in the sensitive Gobustan desert environment.

In order to minimise the impact to topsoil in Gobustan, various alternative mitigation methods have been considered, as outlined in Section 12.2.2.1, Habitats. Such mitigation measures are unlikely to reduce the residual impact to **Low**, but will minimise the extent of the impact as far as practical.

Cumulative impacts with BTC are significant in terms of topsoil degradation in the Gobustan region, since topsoil stored outside KP5-27 (but still within the fragile desert environment) will be subject to an extended period of storage. This will result in an increased degradation in the viability of the seed bank. Residual impacts and mitigation for this issue are discussed further in Section 13, Cumulative Impacts.

12.2.5.3 Compaction

The residual impact of compaction of soils following reinstatement is determined to be of **Medium** significance. Experience from the WREP has shown that, particularly in the desert and semi desert areas, it is not possible to restrict local traffic from using the reinstated ROW. Hence in many non-agricultural areas the ROW has become a frequently used track for local vehicles. This has the effect of increasing the compaction of the soils on the ROW and also impeding biorestitution and vegetation establishment. This will be particularly significant in the sensitive Gobustan desert where a significant period will be required for vegetation to re-establish even in undisturbed areas (see discussion above).

Maintenance of the pipeline will require limited movement of vehicles along the permanent easement, which will lead to some disturbance and compaction of the soils. However, this will be minimal and will not cause a significant impact. The majority of normal pipeline surveillance will not require vehicular access.

However, in very sensitive areas along the pipeline, particularly the fragile Gobustan desert, SCP Partners are assessing a number of ways to eliminate usage of the ROW by local vehicles. Options include:

- Education of the local inhabitants

- Encouragement of the locals to use the numerous tracks that exist in many areas, including Gobustan

Further mitigation is not considered to be practicable and the residual impact will be of **Medium** significance.

12.2.6 Watercourses

Mitigation measures employed during construction have reduced the potential impact on most of the rivers crossed by the SCP to **Low** significance, but there are three rivers where residual impact remains **Medium** and further mitigation is not practicable. Each of the three river crossings where residual impact remains **Medium** is discussed below.

12.2.6.1 Djeyrankechmes (KP9)

This is a deep wadi in the Gobustan desert which is often dry, but liable to flash flooding during periods of heavy rain. During the period when it is flowing, it has a high sediment load. It exhibits poor bank stability at the crossing point, with the western bank being a 10m high vertical cliff of unstable clay rich sediment. It is proposed to open cut this river which will cause a **Medium** visual impact as it will not be possible to recreate the vertical sand cliffs without compromising ground stability and therefore pipeline integrity.

There will also be a short term and very localised impact on flora and fauna as the vegetation within the riverbed provides a varied habitat and the banks provide sites for nesting birds.

Consideration is being given to dual lay and minimising separation of the SCP and BTC pipelines at this crossing in order to minimise the significance of the cumulative impacts of both pipeline developments. This is discussed further in Section 13, Cumulative Impacts.

12.2.6.2 Hasansu (KP397.7)

The Hasansu is a fast flowing clear stream within a deeply incised, steep sided and vegetated valley. The valley and stream constitute ecologically diverse and valuable habitats, with a good variety of species including an Azerbaijan RDB moth.

Geological conditions and the deeply incised nature of the crossing preclude using non-open cut techniques such as HDD for pipeline construction at this crossing.

To manage the potential environmental impacts associated with an open cut crossing, a seasonal constraint has been imposed on the construction in order to protect spawning fish (particularly salmonids), and strict sediment and pollution control procedures will be put in place.

Based on a number of factors including the potential visual impact resulting from earthworks at the river banks, habitat and species the residual impact of this water course crossing is considered to be **Medium** significance.

Consideration is being given to dual lay and minimising separation of the BTC and SCP pipelines at this crossing in order to minimise the significance of the cumulative impacts of both pipeline developments. This is discussed further in Section 13, Cumulative Impacts.

12.2.6.3 Kura West (KP411)

The Kura is the main river in Azerbaijan. At this location it is a fast flowing, wide (approximately 300m) braided channel, composed largely of gravel and cobbles. Any sediment release or leak of oil or diesel during construction would be carried rapidly downstream towards the Shamkir and Mingechaur Reservoirs.

Geological conditions at the Kura West crossing preclude using non-open cut techniques such as HDD for pipeline construction.

To manage the potential environmental impacts associated with an open cut crossing, a seasonal constraint has been imposed on the construction in order to protect spawning fish and strict sediment and pollution control procedures will be put in place.

Based on a number of factors including the potential visual impact resulting from earthworks at the river banks, habitat and species the residual impact of this water course crossing is considered to be **Medium** significance.

Consideration is being given to dual lay and minimising separation of the BTC and SCP pipelines at this crossing in order to minimise the significance of the cumulative impacts of both pipeline developments. This is discussed further in Section 13, Cumulative Impacts.

12.2.7 Air Quality

12.2.7.1 Combustion emissions (construction)

The residual impact of construction emissions on air quality will occasionally be of **Medium** significance for emissions of NO₂. This is a temporary, localised impact and is based on conservative emissions estimates.

12.2.7.2 Dust (Construction)

Dust generation is an inevitable consequence of pipeline construction as it is necessary to remove surface vegetation and the topsoil so that soil structure is not excessively damaged during construction. Although dust generation would initially be less if vehicles ran direct on the vegetation, this would be a short term benefit as the vegetation would soon be uprooted after which it would provide no further protection against dust generation.

The generation of dust will be controlled as much as possible through wet suppression, speed limits for vehicles and the appropriate handling and storage of materials with the potential to generate dust. The assessment of **Medium** significance recognises that Azerbaijan is a windy country, that the soils generally comprise small particles that readily become windborne and that, for most of the year, water is in short supply along parts of the route. Dust generation is therefore likely to occur and deposition on crops has the potential cause reduced crop yields and a nuisance to local residents. The social impacts of dust generation are discussed in Section 12.3, Residual Social Impacts.

Dust generation and deposition is a short-term, intermittent, residual impact. It will primarily be associated with vehicle movements along the ROW during construction. The severity of the impact will fall to **Low** once reinstatement is complete and vehicle movements cease. A further reduction will be seen as vegetation becomes re-established along the ROW.

Dust will be monitored throughout construction and additional dust suppression methods will be adopted if deposition is a nuisance.

12.2.8 Noise

Noise emissions are inevitable during construction and commissioning, and may be of **Medium** significance for short periods in close proximity to dwellings during the evening and night. This will generally be a consequence of construction or commissioning activities which must run continuously once started (usually less than 14 days at any one location). Some exceedance of the stated night-time noise criterion are anticipated. Extensive noise mitigation measures are already proposed and noise will be monitored at sensitive locations (ie dwellings at which the criteria are thought to be at risk). If noise is likely to cause a nuisance at sensitive locations, additional noise suppression techniques will be considered, but may not be practical. Further measures to control the effect of such noise levels would include close liaison with and, in the extreme, temporary relocation of, specific residents.

12.2.9 Beneficial residual impacts

12.2.9.1 Contamination

As discussed in Section 10, The SCP partners will ensure that all areas of recorded contamination along the SCP pipeline ROW will be cleaned up to an appropriate standard prior to commencement of construction. Provided that site-specific risk assessments are undertaken and procedures put in place to eliminate the possibility of mobilisation of contaminants into the wider environment, this will be a positive residual impact.

12.2.9.2 Archaeology

Although pipeline construction has the potential to affect the archaeological record by physically damaging part or all of an archaeological monument it also offers potential benefits in terms of providing information that can be studied by future generations and will add to the general understanding of the history of the area. A linear project creates an increase in knowledge both in previously explored areas, and also in locations where archaeological surveys have not previously been conducted. Observation during the construction activities can create a link between archaeological sites and the landscape and environment that it crosses.

The SCP pipeline has already added new information to the archaeological record of the area, and will continue to do so during the course of pre-construction surveys and during the monitoring of pipeline construction.

A further benefit for the area will be the number of people employed on archaeological excavation and research. This will involve not only local people employed in the physical process of excavation, but will also provide opportunities for training and technology transfer and the sharing of expertise among specialist staff in recording, documenting and conserving the discoveries along the pipeline route.

12.2.9.3 Traffic

There will be a positive residual impact arising from upgrades to existing roads and the construction of new roads. The roads required to carry construction vehicles are typically wider and more robust than the roads that are already in place in Azerbaijan, and upgrades

will be required prior to construction. This is discussed more fully in Section 12.3, Social Residual Impacts.

12.2.9.4 Environmental awareness

Beneficial residual impacts will also be generated by the SCP project as a result of data sharing and knowledge building generally on environmental matters, particularly in Azerbaijan itself. The general level of environmental awareness has already been raised among the local Institutes and Universities that have taken part in baseline surveys and literature reviews as part of the ESIA process. This will continue throughout the life of the SCP project.

12.3 Residual social impacts

12.3.1 Introduction

This Section describes in more detail the residual social impacts of the SCP pipeline. Where necessary, this Section identifies activities that will determine the nature or extent of particular residual impacts, which are not yet fully defined.

The methodology used for defining the significance of each residual impact is provided in the ESIA methodology (Section 7). The following sections detail high, medium, and beneficial residual impacts. The number of the related initial impact, as detailed in the tables in Section 11, is provided. Low impacts identified in the tables in Section 11 are not discussed further.

12.3.2 High residual impacts

12.3.2.1 Access to energy

(Related Impact: 11.3)

As outlined in Section 9 (Socio-Economic Baseline), access to energy is perceived at national level and among pipeline-affected communities to be of high importance as determined during consultation on both the BTC and SCP pipelines, (although more strongly related to the SCP gas pipeline). There will, therefore, be a **High** residual impact of un-met community expectations as the project will not provide communities with additional power directly.

Although it is a legitimate expectation of people to have access to energy, the obligation to provide energy rests with the Government of Azerbaijan. However, BP is in discussion with the Government of Azerbaijan to explore ways in which BP operations in the region can support the Government in this objective.

Gas associated with the ACG oil field that is not used for reservoir pressure maintenance will be provided to the Azerbaijan Government from the Sangachal Terminal. Gas from the Shah Deniz offshore fields will also be available to the Government of Azerbaijan.

12.3.2.2 Un-met employment expectations

(Related Impacts: E2, E3, E4)

Because unemployment in rural Azerbaijan is high, residents in directly affected settlements who are unsuccessful in their job applications are likely to become frustrated when they do not gain employment. All the major towns in the area will also anticipate employment opportunities. This could create resentment and possibly hostility towards those who win jobs and could cause resentment towards the project and the SCP partners.

Measures to manage expectations regarding employment opportunities will help to reduce this potential impact. However, it is likely to remain a key concern of communities and the public in general given the high interest in employment found during the consultation process and is considered to be of high significance.

It is also possible that there will be a short-term residual impact of discontent and perhaps resentment towards the project arising from perceptions of bias in the recruitment process. Experience of large scale construction projects indicates that it will be extremely difficult to eliminate all bias from the recruitment process. This residual impact is expected to be **Medium**.

12.3.2.3 Accidents involving community members

(Related impacts: I3, I6)

It is possible that accidents involving local community members will occur at some stage in the project activities. This could include traffic-related accidents, accidents involving the open trench or other accidents. Although all practical steps will be taken to ensure that no accidents occur any incident that harms a person will have a **High** residual impact in terms of diminishing quality of life for that person, negatively impacting them or their household livelihood, and potentially creating hostility towards the project and project team.

Successful implementation of the proposed mitigation measures, including safety training, traffic management and driver training, and the high priority placed on safety by SCP partners throughout their work, should ensure that the risk of serious accidents is **Low**.

Mitigation measures have been developed to ensure safety close to residential areas, thereby avoiding the possibility of residual impacts occurring. But, as fencing will not be used on all open lengths of trench, there is still a residual risk to the safety of people who move on to dangerous areas of the ROW.

The community liaison team will work with communities to manage issues or anxiety surrounding accidents and to advise on the risks and dangers associated with the project.

12.3.3 Medium residual impacts

12.3.3.1 Grievances over land and livelihood compensation

(Related Impacts: L1, L2, L3, L4, L5, L7, L10)

WREP experience suggests that there will be disputes and disaffection between the project and some landowners and users on the pipeline route. These will be caused by perceived or actual instances of disagreement with regard to the compensation process and/or methodology, and associated impact on livelihoods. This could cause resentment and possibly hostility towards the project and the SCP Partners.

The nature and scale of these negative residual impacts will depend on the quality of implementation of the land acquisition and compensation process, community relations and the grievance procedures. However where grievances occur it is expected that these will be of **Medium** significance until resolved.

12.3.3.2 Infrastructure and services

(Related impacts: Section 11.5)

The mitigation measures identified for infrastructure and services will, if implemented correctly and in full, prevent any planned significant impacts. However, in a project of this size it is likely that there will be instances when infrastructure or services are accidentally disrupted without notice and prior planning. Such disruptions could affect large numbers of people living in extensive areas and, although temporary, there is a possibility that an unplanned disruption could hinder income generation (including subsistence activities) of those affected, for example, by impeding irrigation to crops or, by accidental damage to an irrigation channel. This will also result in residual resentment towards the project. Such instances will be dealt with through the compensation and complaints procedure.

12.3.3.3 Resentment over condition of roads

(Related impact: I2)

While roads will be maintained in at least as good a condition as prior to the commencement of construction, this may not be sufficient to meet community expectations and there may be residual discontent and resentment toward the project and project team, as experience of the WREP has shown. Evidence gathered in some communities through the qualitative survey suggests that this could be significant. The extent of discontent will depend on the temperament and perceptions of individual communities.

However, conversely there is also a real residual beneficial impact regarding roads discussed in Section 12.3.4 below.

12.3.3.4 Accidents on open trench involving livestock

(Related impact: I6)

It is likely that there will be minor accidents involving livestock on the ROW. Basic health and safety management measures are in place to minimise this but as stock proof fencing will not be used on all open lengths of trench there is still a risk that animals could move beyond any marker fences and on to the ROW, which could result in accidents. Compensation measures via a grievance process will be established which will mitigate any losses incurred reducing this impact to **Low**.

12.3.3.5 Access to water resources

(Related Impact: I9)

There is potential for a residual perception of inequity from the communities with poor potable water close to construction camps who are aware that workers have constant access to potable water.

Although water sources will have been carefully selected by the project to avoid impact on local communities, there is a small chance that the project could have a very short term negative impact on the availability of water for communities, particularly during the construction phase, but to some extent during operation for communities near the large AGIs. Mitigation measures developed in Section 11 require the construction contractor to consult with local communities on whether the project's water consumption is impacting household and agricultural supplies so that project water consumption is adjusted accordingly. Similarly the SCP partners will consult during operation to ensure that the project's water consumption has no negative impact. However, in cases where a negative impact is identified, there will be a time delay before consultation takes place and the project's water consumption is adjusted during which household and agricultural water access will be hampered. This will impact both quality of life and livelihoods, particularly agriculturally based livelihoods. The extent of the impact will depend on a number of factors: the season (ie in summer, irrigation is required and the impact will be more severe), the speed at which the water source can be replenished, the number of users relying on the source, and the amount the project is drawing. However, given that the impact will be short-term, the significance has been assessed as **Medium** rather than high.

12.3.3.6 In-migration

(Related impact: C1)

In-migration is likely to occur to a very limited extent, for short periods around construction camps, despite mitigation measures. This could result in a residual impact of increased competition for public services and resources, and increased potential for the spread of diseases and illegal activities including prostitution. The significance of this residual impact is assessed as being **Medium**.

12.3.3.7 Tension between communities, workers and the project

(Related impacts: C2, C3, C4, C8)

It is likely that there will be incidents and tensions between workers and communities at particular times and locations during the construction phase given the number and range of impacts that will affect communities.

Mitigation measures outlined in Section 11, Social Impacts and Mitigation will minimise project impacts but where any incidents are not completely resolved there could be a localized residual impact in loss of trust and increased discontent with the project and project team. The Community Liaison Management Plan and activities are designed to address these situations and to minimise residual discontent or resentment among communities.

The level of trust/resentment will also be affected by the scale, quality and impact of the project's community investment programme which is designed to deliver benefits to communities impacted by construction (see Section 13).

12.3.3.8 Increase in severe diseases

(Related impact: C5)

There is a residual risk that the existence of construction camps and the interaction of the workforce with local residents might either introduce new diseases to the country or the region, or might significantly increase the rate of transfer from one settlement to another,

despite health training on communicable diseases. The likelihood and severity of this risk will depend upon the health of the workforce and the level of interaction with local settlements. This impact may include short term outbreaks of diseases with an impact on mortality rates, but also more serious communicable diseases with a long term effect on community mortality levels.

A rise in communicable diseases is more likely to occur in the large towns rather than the smaller communities along the route where prostitution is strongly discouraged because of stricter social norms in small villages.

It is most likely that the residual impact will be of **Medium** significance, whereby there is a shorter term impact on the quality of life and potentially the ability of households to maintain their livelihoods (either through formal work or from subsistence activities). The residual impact on individuals affected by disease, however, would be **High** if the disease is severe.

12.3.3.9 Perceived inequity in health provision

(Related impact: C6)

Resentment is likely to remain over the lack of access to the project's health services. The residual impact would be concentrated in communities close to construction camps as that is where the project will have health facilities. This has been assessed as of **Medium** significance given the poor quality of the existing health infrastructure.

12.3.4 Beneficial Residual Impacts

12.3.4.1 Additional cash injected into communities

(Related impacts: E1, E10, L1, L2)

Employment is the most significant positive social impact associated with the SCP pipeline project in the short-medium term. There will be a positive residual impact of the income obtained and spent by local workers in the community. This will be limited in each individual community by the short-term nature of the employment of unskilled workers, but more prolonged in the case of semi-skilled or skilled labour. The result should be an increase in standard of living for families and additional indirect employment for local businesses as a result of more cash in the local economy. The key issue in determining the scale of this impact will be the total number of Azerbaijanis employed in construction, and the duration of their employment. Potential construction contractors have been encouraged to maximise the national employment on the project and targets for levels of national employees will be agreed in discussion with the preferred contractor.

There will also be a positive residual impact from the money spent locally on goods and services by foreign construction workers in the local communities, which could also help to create temporary indirect employment.

Additional cash will also be injected into local communities through the land compensation programme. This positive impact will depend on the extent of out-migration from the affected communities.

12.3.4.2 Wide distribution of economic benefits

(Related Impact: E2)

Management measures for the recruitment process should ensure that the distribution of jobs and therefore the distribution of economic benefits is spread out over the route. However, individual unskilled jobs will be relatively short (ie- 2-3 months). Skilled and semi-skilled workers may benefit from longer periods of employment.

12.3.4.3 Enhanced local experience and employability

(Related Impacts: E7, E11)

There will be benefits in terms of the additional experience and skills gained by pipeline workers and workers in the operational phase. This will apply to some extent to all workers. However it will be more significant for those participating in skills development programmes, and also for skilled workers who will be employed for longer periods. The future employment prospects of these workers will be enhanced, especially as regards SCP. Hence, the indirect benefit to the families and communities could be significant.

The potential to realise this positive impact will depend on the training programmes developed by the construction contractor, future business development demands, and to some extent on the individuals willingness to learn. Employees are more likely to have enhanced employment prospects following construction, since they may also be eligible for positions in other industries.

There will be a positive residual impact for companies (and their employees) benefiting from supply contracts through increased skill levels and experience. The scale and distribution of this impact will depend on the number of contracts let.

12.3.4.4 Economic benefit of indirect employment opportunities

(Related Impacts: E8, E9, I3, I7, I8, I9, I13)

If local people remain living within the local communities much of the cash injected is likely to remain within the local economy beyond the construction period, creating a positive residual impact.

Road-side stalls (I3)

Many communities perceive that there will be an economic benefit to local businesses from additional traffic.

Local Purchase of Diesel (I7, I8)

The in-country purchase of diesel will have a positive economic impact for Azerbaijan, primarily Baku as this is likely to be purchased through Baku-based companies. In addition diesel will probably be used for power generation at the construction camps and major facilities along the route. This will have a further positive economic impact.

Bottled Water (I9)

If bottled water is sourced locally, there would be a positive economic impact in terms of money earned from the sale of water. This will not impact pipeline affected communities who do not have local sources for bottled water.

Local Purchase of Aggregate (I13)

Positive economic impact, though short-term in nature. The scale of this impact will depend on the quantity the selected contractors purchase, and on the sources selected.

12.3.4.5 Enhanced capacity to tender for contracts

(Related Impacts: E8)

Skills developed by local businesses during contracting arrangements for this project will enhance the ability of these Azerbaijani companies to respond to other tenders. This will include overall business management skills such as health and safety, quality assurance and project management.

12.3.4.6 Use of wood cleared from ROW

(Related Impact: L9)

Because small trees and branches cleared from the ROW will be given to local communities to use for firewood, there is a positive short term residual impact arising from provision of additional fire wood at no cost and minimal effort to the individual. This impact is expected to be **Low** in Azerbaijan because of the low numbers of trees along the pipeline corridor.

12.3.4.7 New roads / improvements to roads

(Related impacts: I1, I2)

There will be a **Beneficial** impact arising from upgrades to roads, particularly as the roads required will be typically larger roads than are currently used (excepting main highways). Consultation with affected communities in Azerbaijan shows that communities list improvements to roads as a priority and this will therefore be an important benefit of the project.

There will be a **Beneficial** impact arising from construction of reasonable quality new roads where they can be used by the local population for access to markets, education etc. This is dependent on community support for not removing the roads once construction is complete and local government ability and willingness to maintain the new roads. If communities want the roads removed, there is no residual impact.

See 12.3.3.3, Resentment of Conditions of Roads.

12.3.4.8 Improved health awareness

(Related impact: C5)

Health awareness raising programmes in local communities will result in a positive residual impact for the quality of life of local communities. This will be reinforced by any BP community investment projects which focus on health.

12.3.4.9 Access to new cultures and international attitudes

(Related impact: C7)

There are some opportunities for the internationalisation of local communities / greater tolerance and awareness of other cultures which can be seen as a positive residual impact if communities welcome this.

12.3.4.10 Complaints procedure

(Related impact: C9)

A fair and effective complaints procedure will help to establish a legacy of trust and good relations with communities. The level of trust will be determined by the quality of implementation of all measures, not simply those related to community relations.

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13 CUMULATIVE IMPACTS

13.1 INTRODUCTION

This Section presents the assessment of cumulative impacts that may result from the interactions of construction and operation of the SCP with other projects and activities.

13.1.1 Scope of cumulative impact assessment

The IFC Procedure for Environmental and Social Review of Projects (IFC, December 1998) states that environmental assessment should include consideration of:

“...cumulative impacts of existing projects, the proposed project and anticipated future projects.”

To identify which other projects need to be considered alongside the project being assessed the IFC Procedure states that:

“Assessment of cumulative impacts would take into account projects or potential developments that are realistically defined at the time the environmental assessment is undertaken, where such projects and developments could impact on the project area”.

Cumulative impacts are those that may result from the combined or incremental effects of past, present or future activities. 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.

This cumulative impact assessment covers past present and future interactions between the SCP project and other activities in the same geographical area.

13.2 SPATIAL AND TEMPORAL BOUNDARIES

The cumulative effects of the project are considered in this section at a Regional (Section 13.4), National (Section 13.5) and Route Level (Section 13.6).

Regional level: The spatial boundaries of the regional cumulative effects assessment reflect the overall geographic span of the project scheme from the Caspian to Turkey. Within this region, and in the context of oil and gas production and transportation systems, the region can be defined as including the Caspian, the Caucasian belt and Southern Russia, the Black Sea and Turkey.

The region will be hereinafter referred to as the Trans-Caucasian belt. The assessment of cumulative effects on the natural and social environment therefore includes regional activities directly and indirectly related to the project. For the SCP project this includes the development of the Shah Deniz field and other hydrocarbon fields in the Caspian, and the development of regional oil and gas transportation systems.

The assessment of regional cumulative impacts is complemented by a broad-based review commissioned by BP to identify the economic, social and environmental benefits of the ACG, BTC and Shah Deniz projects at the regional and national level, and to advise BP and other

interested parties, on steps to enhance the sustainable development opportunities presented by the projects and to minimize any risks that they present. This study is entitled 'Economic, Social and Environmental Review in the National and Regional Context'.

The Regional Review covers the following issues:

- Revenue management
- Local employment and supply chain management
- The non-oil economy
- Poverty and inequality
- Human rights
- Conflict
- Access to energy
- Regional export options
- Climate change
- Biodiversity and
- Institutional capacity

The full Regional Review report will be made available in 2002. A summary of findings is presented in this section.

This Review concludes that the SCP, Shah Deniz, ACG and BTC projects will have a large effect on the development of Azerbaijan and Georgia primarily because of their size in relation to the rest of the economy. The extent to which they contribute to sustainable development depends largely on the decisions taken by government, especially concerning revenue use and the fight against corruption.

The Review concludes that the major economic and socio-economic implications of the projects are expected to be in Azerbaijan and Georgia as opposed to Turkey. Government revenues will be generated by the project in both countries that could be used to finance reform and re-development. Here the footprints of the projects are larger in comparison to current government revenues, to other investment plans and donor credits, and have a greater potential to influence other foreign direct investment decisions. They also have a higher public profile than in Turkey.

Poverty and inequality, corruption, human rights and conflict are issues in each of the three countries. There are initiatives by governments and the international community to reduce poverty and corruption, to bolster human rights and to resolve the several 'frozen' conflicts in the region. There is scope for the projects to contribute positively on these issues by applying high standards and setting best practice in dealing with them. Several important steps have been taken in the design stages of the projects in relation to construction, operations and engagement to set and apply these high standards.

The projects will also make a contribution to the shortfall of energy available in Azerbaijan and Georgia largely by providing gas at lower prices to both countries' gas infrastructure. However the projects alone will not solve the deep and complex problems of access to energy.

From a regional environmental perspective, the Review concludes that the projects would facilitate the large-scale introduction of international standards for health, safety and environmental protection. There are oil spill risks as with any other oil production and pipeline project, and some areas of high biodiversity will be affected, although a range of project-level activities and a regional biodiversity initiative will compensate these impacts.

National level: In this ESIA report, national level cumulative effects refer to those that could

occur within Azerbaijan as a result of the interaction of the various projects taking place within the country. These include other oil and gas related projects in Azerbaijan (eg the operation of the WREP and the Sangachal Terminal) and other non-oil and gas projects in the area (eg current industrial emissions within Azerbaijan).

Route level: The cumulative effects assessment at the route level is based on the likely construction of the BTC pipeline and the SCP sequentially in the same corridor. This will extend the overall construction period and therefore the period over which the most significant impacts are felt.

The temporal boundaries of the assessment coincide with the operational life of the project, which is 30 years. The majority of the effects will occur in the short and medium term, during construction.

13.3 PROJECTS OVERVIEW

13.3.1 General

The Trans Caucasian belt has seen recent developments in the oil and gas sector following the discovery of new fields and development of known fields in the Caspian Sea and in many onshore areas of the region.

The development of early production and transportation facilities by multi-national oil majors has heightened environmental awareness in the region and highlighted the key environmental and social concerns. The main oil and gas projects that are under way in the region are discussed in Section 13.3.2 below.

13.3.2 Summary of relevant projects

The two major oil and gas developments currently under development in the Azerbaijan sector of the Caspian Sea are the ACG oil and Shah Deniz gas projects. Crude oil from the early development of the ACG fields is currently transported through the WREP and NREP pipelines. The BTC pipeline will provide transportation capacity for crude oil volumes from subsequent phases of the ACG full field development, transporting the oil to world markets.

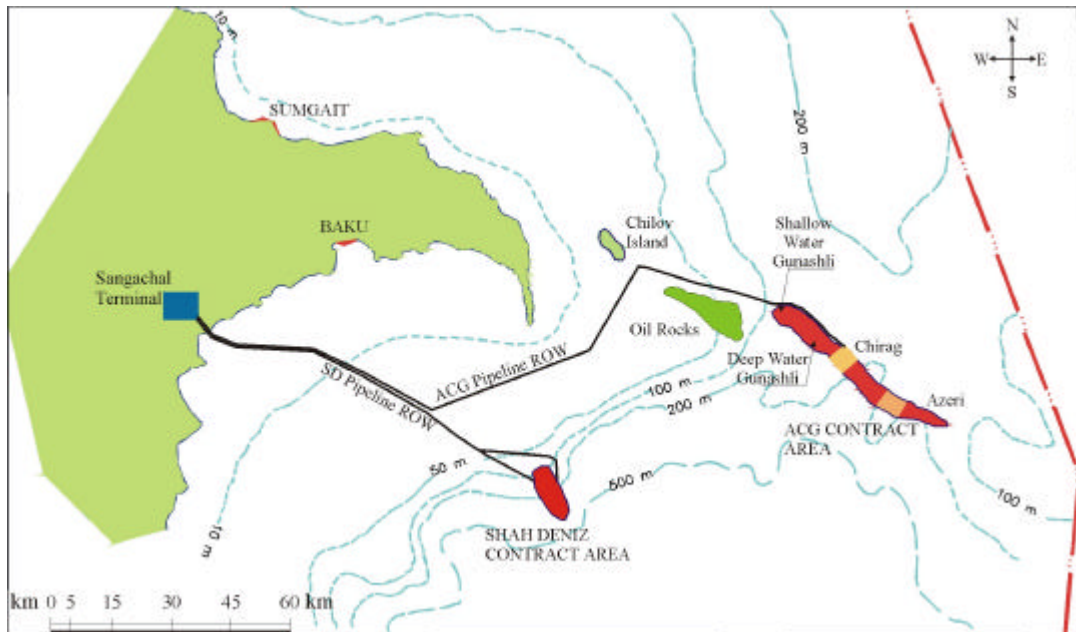
Gas will be produced from the Shah Deniz field and transported by pipeline to Turkish and domestic markets via the SCP. It is proposed that the SCP will run along the same route as the BTC oil pipeline in Azerbaijan. The oil and gas from these two developments will be transported via an onshore terminal at Sangachal, 40km outside Baku.

The routes of existing and proposed export pipelines from Azerbaijan are shown in Figure 13-1, while Figure 13-2 shows the location of the offshore oil and gas fields and Sangachal Terminal, and the approximate routes of the offshore export pipelines.

Figure 13-1 SCP pipeline alignment in relationship to other export pipelines from Azerbaijan



Figure 13-2 ACG and Shah Deniz contract areas and offshore export pipelines



13.3.2.1 The Azeri-Chirag-Gunashli (ACG) development

The ACG project consists of the phased development of the Azeri, Chirag and Deep Water Gunashli (DWG) oil fields, offshore Azerbaijan. One production platform, Chirag-1, is currently producing 120,000 bopd which is transported by offshore pipeline to the Sangachal Terminal, then primarily exported via the WREP to Supsa on the Black Sea coast of Georgia, and then by

ship to international markets. A portion of the oil may also be exported by the NREP to Novorossiysk on the Russian Black Sea coast, also for onward shipment. Expansion of the ACG project consists of three phases, as described below:

Phase 1: Offshore development of the Azeri field comprising a production, drilling and quarters platform, and a gas compression and water injection platform. The oil will be transported to Sangachal Terminal via a new 30" oil export line. A certain amount of the produced gas will be re-injected into the oil reservoir to enhance oil recovery, whilst the remaining gas will be transported to Sangachal for processing via a new 28" pipeline.

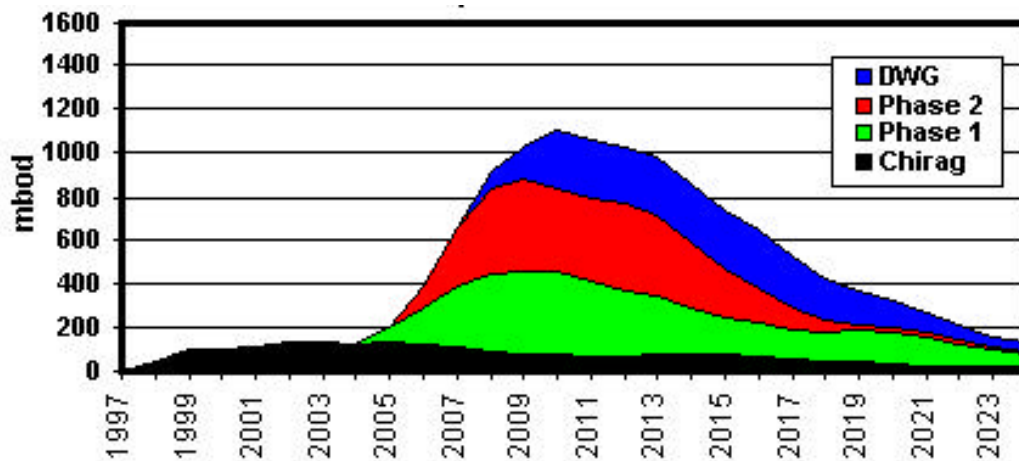
The Sangachal Terminal will be expanded to process the additional oil and gas produced.

Phase 2: Development of the remaining part of the Azeri field which is expected to consist of two further production, drilling and quarters platforms, with associated pipelines and a further expansion of the Sangachal Terminal.

Phase 3: Development of the DWG field which is expected to consist of two platforms: a production, drilling and quarters platform, linked to a gas compression and water injection platform.

Predicted production profiles for the ACG developments are shown in Figure 13-3.

Figure 13-3 Production profiles from ACG Id development



13.3.2.2 The Shah Deniz project

The Shah Deniz project involves extracting gas/condensate from offshore deposits in the Caspian and exporting it to Turkey through Azerbaijan and Georgia.

The first stage of the Shah Deniz development will consist of a production and drilling platform, offshore gas and condensate pipelines to the onshore Sangachal Terminal, and expansion of the terminal facilities. At the terminal, gas will be conditioned for export, and the stabilised condensate will be blended with the crude oil produced from the ACG development. Some of the gas will be provided to the Governments of Azerbaijan and Georgia under the terms of sales and purchase agreements. Gas to Azerbaijan will be input directly into the existing national supply grid in the vicinity of Sangachal. The majority of the gas will be exported for sale to Turkey, via the SCP, where it will feed into the domestic supply grid.

13.3.2.3 The BTC project

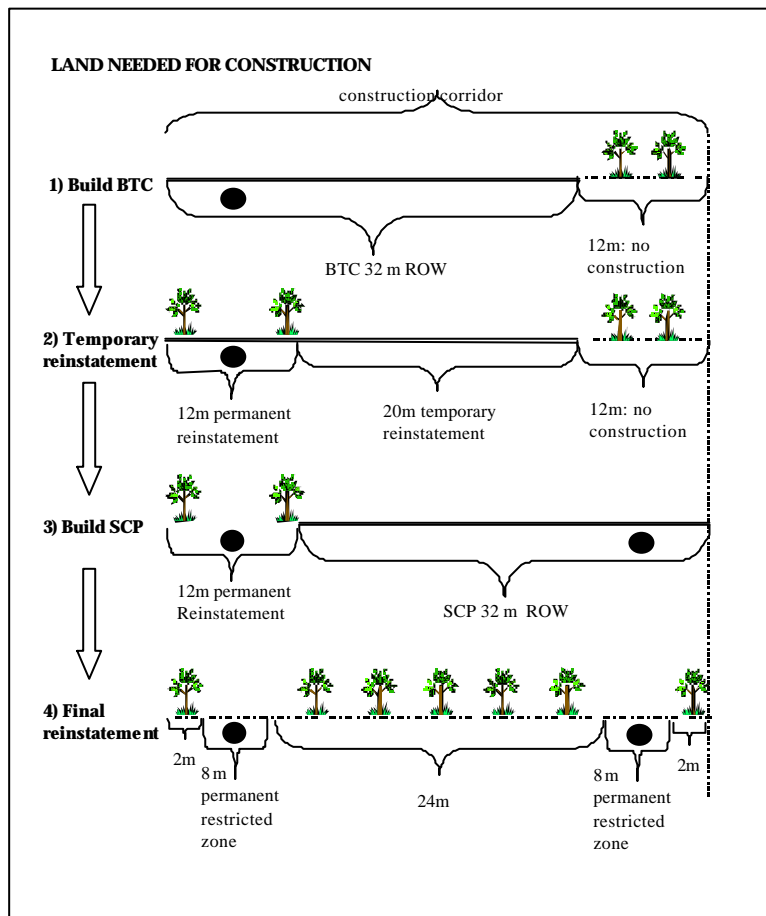
It is intended that the SCP will follow the same alignment as the BTC oil pipeline within Azerbaijan and Georgia. The BTC pipeline will be 42" in diameter and will continue from the endpoint of SCP at the Georgian border to the Mediterranean coast at Ceyhan in Turkey.

It is currently proposed that the BTC and SCP projects are fully integrated, with BTC being constructed first, to maximise the synergy benefits of the two projects, including minimising the environmental and social impacts.

The two pipelines will be built within a construction corridor of approximately 44m. The current proposal is that 32m of the 44m total is stripped for the construction of the BTC pipeline, and that once this is installed, 12m of the strip is immediately reinstated, and the remaining 20m is stabilised as required. In the following year, the untouched 12m section is stripped to provide a total ROW of 32m for the second pipeline (SCP). After installation of the SCP the whole 32m used for SCP will be reinstated. This scenario is illustrated in Figure 13-4.

SCP construction is currently programmed to follow in the year immediately after the construction of the BTC pipeline (Scenario 1). However, the potential cumulative impacts from the construction of the SCP at periods of between two and four years (Scenario 2), and more than four years (Scenario 3) after the construction of the BTC pipeline have also been considered in this Section.

Figure 13-4 Proposed working width for both BTC and SCP construction



In the event that the SCP construction is not scheduled for the year following BTC pipeline construction, the whole 32m ROW will be reinstated after installation of the BTC pipeline. For subsequent construction of the SCP 20m of ROW which had originally been stripped for BTC pipeline installation would be re-stripped along with an additional 12m, to give a total SCP ROW of 32m.

13.3.2.4 The WREP and NREP

Two pipelines have already been developed by the AIOC to export oil from the early production of the ACG field. The pipelines, known as the NREP and WREP, are currently in operation and transport 100,000bpd (this volume includes some additional oil from SOCAR) and 115,000bpd respectively.

The routes of both pipelines are shown in Figure 13-1. The BTC pipeline will be constructed along predominantly the same route as the WREP within Azerbaijan. There will be no cumulative impacts as a result of the NREP and BTC pipeline projects.

13.3.2.5 Other oil and gas developments in the vicinity of the SCP

In addition to the development projects mentioned above there are other oil and gas concessions, both onshore and offshore, which are the subject of Production Sharing Agreements (PSAs) between private companies and the Azerbaijani Government. The Azerbaijan onshore concessions that are close to the route of the SCP are shown in Figure 13-5. It can be seen from Figure 13-5 that the SCP route crosses the south-west Gobustan concession which has been licensed to Commonwealth Oil and Gas. This concession is currently non-operational. The proposed development programme includes the rehabilitation and drilling of several hundred wells across the area. The schedule for this work is subject to appropriate financing.

13.3.2.6 The Northern Caspian oil fields and the CPC pipeline

Whereas the Shah Deniz and ACG projects originate from Southern Caspian offshore fields, significant hydrocarbon production also occurs in the Northern section of the Caspian, in Kazakhstan and Russia. Existing oil fields such as the onshore Tengiz facilities in Kazakhstan and large offshore fields both in Kazakhstan and Russia have the capacity to increase the current oil and gas production in the region by an order of magnitude.

In 1999, total liquids production from the Tengiz field increased to 214,000bpd. The expectation is to grow this production to 700,000bpd by 2010. Tengiz crude is transported by a variety of means, including pipeline, rail and barge. Principal destinations include the Black Sea ports of Odessa, Feodosia and Batumi. Crude production exported by railcar reached 161,000bpd in 1999 (77% of the total production).

Currently Kazakhstan exports oil through the region of interest of this study by shipping oil to Azerbaijan and subsequently transporting it by rail through Azerbaijan and Georgia to the Black Sea port of Batumi. These exports amount to approximately 100,000bpd and exit the Trans Caucasian belt through the Bosphorus Strait in oil tankers.

The operators of the Tengiz oil field have recently commissioned the CPC (Caspian Pipeline Consortium) pipeline that, at full capacity, will have the ability to transport approximately 1,500,000bpd. The CPC pipeline terminates at Novorossiysk on the Black Sea, from where crude oil is either shipped to markets via the Bosphorus Strait or piped to European refineries through Central European pipeline systems. It is expected that the CPC pipeline will be used for export

from other oil fields in the Northern Caspian, currently in their early stages of development.

13.3.2.7 The Blue Stream gas pipeline

The Blue Stream gas pipeline is a gas export system from Russia to Turkey that is currently under construction. The project consists of the construction of a sub-sea pipeline through the Black Sea with the aim of providing Turkey with an additional supply of natural gas to meet the expected increased demand for power generation.

13.3.2.8 Minor projects

Several more modest oil and gas projects are also being developed in the region, associated with the development of onshore fields in Azerbaijan, Georgia, and Southern Russia and the related transportation and utilisation of the produced fluids. From publicly available sources it is estimated that the overall contribution of the minor projects to the flow of hydrocarbons in the region is less than 5% of the main flows described in the previous Sections.

Other potential projects, yet to reach the detailed planning stage, include the development of a crude oil refinery in Supsa and of offshore hydrocarbon deposits in the Black Sea.

13.3.2.9 Summary of hydrocarbons flow in the Trans-Caucasian belt

Table 13-1 below summarises the main developments taking place in the region and the associated flows of hydrocarbons through the Trans-Caucasian belt, when all identified projects will be at peak capacity (approximately 2011).

Table 13-1 Summary of predicted regional flow of hydrocarbons

Project name	Crude oil (bpd)	Natural gas (billion m ³ /year)
Shah Deniz/SCP	54,000 a	8.2
ACG	1,100,000	14
Tengiz	700,000	Not known
Other Northern Caspian oil and gas fields	800,000	Not known
Blue Stream		16
Minor projects	250,000	0.5

^a Condensate separated from the gas.

The above summary does not include oil and gas production from offshore Turkmenistan or Iran, nor the onshore production from Turkmenistan and Uzbekistan that flows to Iran. Figures for current oil and gas imports into Turkey and refined products import through the Black Sea are also not included.

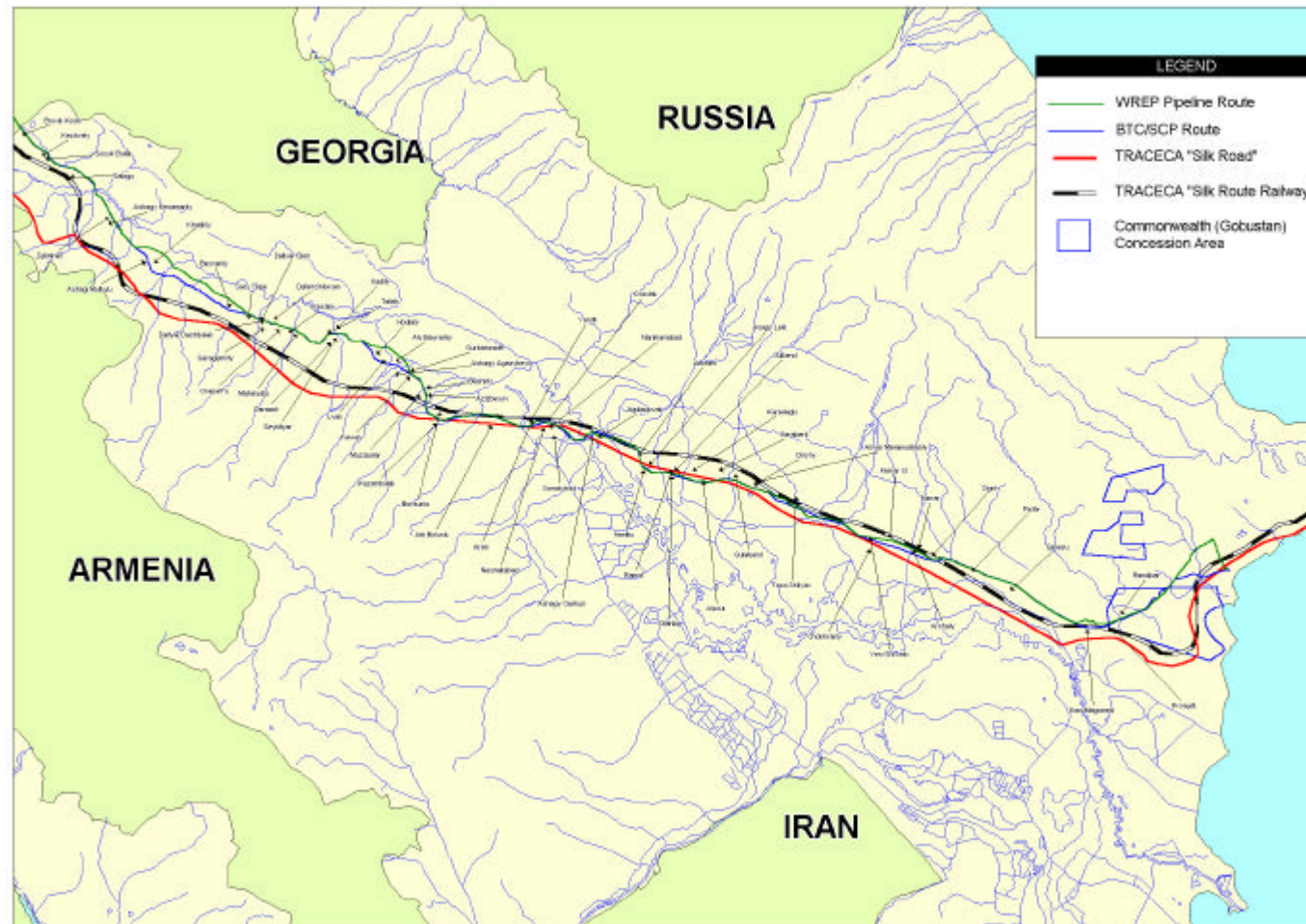
13.3.2.10 Non oil and gas projects

There are a number of non-oil and gas industry developments proposed over the next few years that are of relevance to a consideration of cumulative impacts with the SCP.

These include an EU-funded transport corridor project, TRACECA, which aims to connect Europe with Asia via nine trans-Balkan highways. A new East-West road, running roughly parallel to the existing Baku-Tbilisi highway, but in some places replacing it, is currently under construction as part of this project. This road is commonly referred to as the 'Silk Road'. In early 2002 construction of the Silk Road was yet to reach Kazi-Magomed (corresponding to approximately KP52 of the SCP).

The TRACECA project also includes improved and new-built railway between Baku and Tbilisi, the schedule for which is not clear at present. The proposed route of the railway and the Silk Road are shown on Figure 13-5.

Figure 13-5 Other existing and proposed projects in the vicinity of the SCP pipeline



13.4 EVALUATION OF REGIONAL ACTIVITIES

On a regional scale the main temporal and spatial cumulative impacts relevant to the construction of the SCP relate to the expansion of the Sangachal Terminal, the construction of the BTC pipeline and construction of the Silk Road.

13.5 GLOBAL CUMULATIVE IMPACTS – ENVIRONMENTAL

13.5.1 Climate - Greenhouse gases

The SCP, BTC pipeline and Sangachal Terminal greenhouse gas emissions (GHGs) need to be considered in a cumulative context.

There will be varying amounts of total GHG emissions from the projects listed above, depending upon the phase of each projects development. It is anticipated that the maximum total GHG emissions will occur when the Sangachal Terminal, the BTC pipeline and the SCP are operational. It is likely that this scenario will occur approximately two to three years after the completion of the BTC pipeline. Table 13-2 shows the estimated contributions of the three projects in comparison to the projected total GHG emissions from Azerbaijan for 2005 (the latest year for which predicted emissions are available) The cumulative GHG emissions in 2005 will be approximately 0.7% of the predicted total for Azerbaijan in 2005, constituting a **Low** level impact.

Table 13-2 Estimated contributions of GHGs by the BTC pipeline, Sangachal Terminal and SCP projects by comparison with projected national emissions in Azerbaijan (2005)

SOURCE	EMISSION (TONNE PER YEAR)		GWP (TONNE CO ₂ EQUIVALENT PER YEAR)
	CO ₂	CH ₄	
SCP construction	0	4	84
BTC pipeline operation	220,000	32	221,000
Sangachal operation (2005)	275,000	25	276,000
Total	495,000	61	496,000
National Inventory Forecast 2000	41,544,000	1,253,000	68,818,000
% BTC pipeline operation and SCP construction to 2000 emissions	1.2	0.0	0.7

Note: All figures are estimates only, with significant uncertainty

The above scenario represents the worst case currently anticipated. Annual GHG emissions from operation of the BTC pipeline are approximately 1.5 times higher than those estimated for its construction. Operational emissions from the SCP are negligible by comparison to its construction. The BTC pipeline will be operational from 2005, however pump station PS A2, which is the primary source of operational emissions, will not be fully operational until 2008. Thus, construction of the SCP and full operation of the BTC pipeline will not coincide and this scenario has not been considered.

It can be seen from the above that the relative contribution of project activities is, as a worst case, relatively small for a major infrastructure development in Azerbaijan.

13.5.1.1 Air quality (potentially local, national and trans-boundary cumulative impacts)

National level environmental impacts are restricted to those related to air emissions.

The potential for a cumulative impact upon air quality arises from:

- Operation of the proposed BTC pipeline facilities
- Operation of the proposed SCP facilities
- Operation of the WREP
- Operation of the Sangachal Terminal
- Existing industrial emissions within Azerbaijan

13.5.1.2 Acidification

NO_x and SO_x may undergo transformation in the atmosphere to acidic compounds (eg nitric and sulphuric acids) potentially leading to acid rain deposition. These transformations represent important removal mechanisms for these compounds from the atmosphere, however, their presence may lead to the formation of 'acid rain'. Acid rain has historically been shown to lead to stress of ecosystems and damage to structures, particularly those constructed of limestone.

The BTC pipeline facilities are anticipated to lead to the generation of 1,374 tonnes per year of NO_x and 198 tonnes per year of SO₂ during peak export. These represent 1.2% and 0.4% of the 1994 Azerbaijan national inventory, the latest year for which data is available. If SCP gas becomes available these predicted annual emissions of NO_x and SO₂ would be significantly reduced and SCP will therefore have a positive cumulative impact.

13.6 TRANS-BOUNDARY IMPACTS

Trans-boundary impacts are impacts that affect the natural environment and/or socio-economic conditions outside of the country in which project activities are proposed to occur. Potential trans-boundary impacts are not necessarily limited to those countries that directly neighbour the project's host countries and can affect countries or areas some distance away.

Atmospheric emissions during construction are anticipated to be the principle potential trans-boundary impact of the SCP and related projects.

Throughout the duration of the project, several activities will lead to the release of a number of potentially polluting gases to the atmosphere. These gases have a number of potential effects upon the environment (see Section 10, Environmental Impacts and Mitigation) including potential trans-boundary impacts:

- Acid deposition (wet and dry)
- Deterioration of air quality (directly or indirectly)

The potential for gases to give rise to trans-boundary impacts is dependent upon the residence time, the behaviour of the gas once released to the atmosphere and the distance the pollutant travels from its source. For the majority of gases, the residence time (or atmospheric lifetime) in the atmosphere following release is only one or two days. The distance that such gases may travel and the direction in which they travel is primarily related to meteorological conditions, in particular wind speed and direction.

13.7 NATIONAL LEVEL CUMULATIVE IMPACTS

Projects relevant to a national level assessment of cumulative impacts include the following:

- Operation of the proposed SCP
- Operation of the proposed BTC pipeline facilities
- Operation of the WREP
- ACG full phase development (including operation of Sangachal Terminal)
- Existing industrial emissions within Azerbaijan

13.8 ROUTE LEVEL CUMULATIVE IMPACTS

The previous Sections of this ESIA have only addressed the impacts associated with the construction of the SCP pipeline at a local level. However, the pipeline is being constructed in close proximity to existing and future projects including:

- The WREP
- The Sangachal Terminal and the landfall of the ACG and Shah Deniz offshore pipelines
- The Silk Road and Railway
- SCP in the year after BTC (Scenario 1)
- SCP, after a delay of two to four years from BTC (Scenario 2) or more than four years from BTC (Scenario 3)
- BP environment and community investment projects (discussed in Section 13.7)

The base case scenario for the BTC and SCP projects assumes that SCP will be built in the year after BTC (Scenario 1).

The cumulative impacts in the following sections are assessed against the baseline conditions described in Sections 8 and 9. Where there is sufficient knowledge about the other projects, the same significance criteria and ranking system have been used as for the SCP project alone, in line with the definitions of the levels of residual impacts in Section 7. However where there is less project definition it has been deemed inappropriate to apply these significance criteria, and professional judgement has been used.

Construction of the SCP and BTC projects has been integrated, thus minimising the potential for any negative cumulative impacts from the outset, as compared to developing the two projects in isolation. One of the key aspects of this has concerned the routing of the pipeline, where it has been possible to select a route that can be used for both SCP and BTC.

It has been determined that construction of the two pipelines will run sequentially. There are a number of reasons why it is not practical or desirable to construct both pipelines simultaneously, including:

- The need for a much wider construction corridor, so increasing habitat disturbance
- The requirement for mobilization of twice as much equipment
- The significant threat to the delivery of both projects in the required timescales
- The need to pre-invest in SCP as the pipeline is not required to be operational until 2005, when Shah Deniz gas becomes available

Table 13-4 provides an indication of the types of cumulative environmental impacts that could occur as a result of the SCP pipeline being constructed in proximity to the other projects listed above.

Table 13-3 Cumulative environmental impacts of the SCP pipeline with other projects in the area

Aspect	SCP pipeline along the existing WREP	SCP pipeline and Sangachal Terminal development	SCP pipeline and BTC	SCP pipeline and the Silk Road/ Railway
ENVIRONMENTAL				
Air quality				
Noise				
Soils				
Geology				
Hydrology				
Landscape				
Archaeology				
Ecology				
Traffic				
Use of natural resources				
SOCIO-ECONOMIC				
Wealth and employment				
Infrastructure				
Land and land based livelihoods				
Community relations				
Nuisance				

The key cumulative impacts are highlighted in the above table by shading. Those cumulative impacts which have been assessed as the most significant, (**Medium** or **High**) are denoted by a yellow cell. The cumulative impacts are discussed in more detail, by issue, in the following Sections. Where there is no shading, the assessment has concluded that cumulative impacts are not likely to occur.

13.8.1 Air quality

Construction of the SCP pipeline, extension of the Sangachal Terminal and construction of landfall pipelines will result in a localised reduction of air quality over a short period, due to increased construction vehicle and equipment exhaust emissions. There will also be localised increases in dust generation, which could lead to cumulative impacts on areas used for grazing downwind of the terminal area.

During operation there will be minimal emissions from the SCP pipeline, and hence the cumulative impacts upon air quality will be Low. One of the more significant emissions sources during operation is the main compressor station for SCP, which is within the fence line of the Sangachal Terminal. This has been assessed as part of the ACG Phase 1 ESIA.

Construction of the SCP following construction of the BTC pipeline will result in an extended period over which combustion emissions from vehicle exhausts are increased along the pipeline route.

With regard to dust emissions, construction of the SCP at any stage will produce localised cumulative impacts on crop yield. Construction of the SCP in the year following BTC pipeline construction is likely to cause a cumulative impact of a higher magnitude but over a shorter period to that incurred if SCP construction were to be delayed. If there was a delay to the construction of the SCP additional vehicle and dust emissions would result from the increased activities required to reinstate the working width, then topsoil strip it again immediately prior to SCP construction.

During the operational life of the SCP, atmospheric emissions from associated pipeline facilities such as block valves will add to those produced by the BTC facilities. It should be noted that block valves on both pipelines are generally expected to use mains power for their electrical requirements, with diesel generators used for back-up power. The power requirements for the SCP block valves will be minimal as the actuation of these valves will be achieved using pressurised gas taken from the pipeline. Cumulative impacts during operation are anticipated to be **Low**.

The construction of the Silk Road will produce air emissions from the operation of various types of construction plant. The road is being built in sections, and current construction progress indicates that it is possible that the construction operations for both the SCP pipeline and the Silk Road may occur in the same general vicinity at some point in time. In this event there may be a localised, short-term reduction in air quality. There will also be localised increases in dust generation, which may lead to a short-term cumulative impacts on crop yields and bees at some locations. Significance is assessed as **Low**.

13.8.2 Noise

During construction of the Sangachal Terminal, the offshore pipelines landfall and the SCP or BTC pipeline, localised increases of noise in the vicinity of the Sangachal Terminal could result in a short-term cumulative effect on local people (for example sheep herders). This is regarded as being of **Low** to **Medium** significance.

Construction operations will only occur in a particular section of the pipeline route for a relatively short period, and while it is possible that noise receptors are subject to construction noise in two consecutive years, the actual time over which noise is heard will be relatively short. In the event that construction of the SCP is delayed, there will be a slight increase in the total time period over which noise is generated by the construction work (caused by the extra reinstatement and topsoil stripping), however this is not considered to be a significant cumulative impact.

If the BTC pipeline is operational when the SCP is constructed, then in areas around the pumping and pigging stations there will be a cumulative noise impact of **Low** magnitude.

The construction of the Silk Road will produce noise from the operation of various types of construction plant. As described above, there are potential interactions between SCP and the Silk Road project, however, the significance of any potential cumulative noise impact is **Low**.

13.8.3 Soils

Construction of the SCP, Sangachal Terminal and the offshore pipelines landfall will result in an increased area where soils are disturbed and exposed to wind erosion in the Gobustan semi-desert environment. This is considered to be a cumulative impact of **Low** significance.

If the SCP were built in the year following the BTC pipeline, there would be a cumulative impact of two consecutive years construction activity on the soils of the central section of the construction corridor. This could potentially impact upon soil structure and lead to increased wind erosion.

If there is more than 12 months between construction of the two pipelines then topsoil will be replaced, soils stabilised and interim reinstatement carried out, immediately following installation of the BTC pipeline. Approximately 60% of the reinstated ROW would then be re-exposed before installation of the SCP. While the overall period of bare soil exposure would be decreased in this scenario, cumulative impacts to the soil would result from reinstatement and then re-stripping of soils in the joint construction area.

This would impact upon soil structure and contribute to windblown dust and erosion. The structure of the soils in the 'badlands' is such that localised cumulative impacts could be **High**, however in other areas the degree of impact would be much reduced to **Low** to **Medium** as the soils have a more consolidated structure.

Topsoil degradation would be reduced significantly if construction of the SCP in Gobustan were to take place shortly after BTC.

In order to reduce the cumulative impacts of crossing erodible soils on certain narrow ridges SCP will be laid at the same time as the BTC pipeline. This will be the base case for the Mud Volcano Ridge and is being considered for the Tovuzchay, Azrinchay and Hasansu ridges. Use of dual lay will eliminate the need for repeated disturbance to these areas. In the case of the mud volcano ridge the separation between the pipelines will be minimised, therefore reducing the area which will be impacted.

13.8.4 Geology

Throughout the majority of the BTC and SCP routes the pipelines are constructed in soils overlying rock. The construction of both pipelines will therefore have a minimal impact upon the solid geology along the route.

However, the crossings of the Shamkir and Kura Rivers by both pipelines are located close to areas of aggregate extraction. Once the pipelines are laid, there may need to be a restriction upon the depth to which extraction can take place in the Shamkir River, despite the deep burial of the pipeline. The cumulative impact upon economic geology has been assessed as **Low** significance.

13.8.5 Hydrology and hydrogeology

Banks of river crossings will be stabilised and/or reinstated immediately after the pipeline construction to reduce erosion to the bank structure as far as possible. In the case of the Hasansu and the Kura West River crossings consideration is being given to laying the pipelines simultaneously. This would eliminate the need for repeated disturbance to these areas, and would mean lower overall impact than if two pipelines were constructed separately and can be considered a mitigation of the cumulative impact.

Given the mitigation measures which will be adopted, cumulative impacts to hydrology from construction of the SCP in either the year following the BTC pipeline or at a later date are assessed as **Low**. However, this would rise to **Medium** at the Hasansu and Kura West Rivers if dual lay is not implemented.

Any impacts caused by an increased demand on local water resources (in terms of water usage at camps etc) from pipeline construction, will be increased by the construction of two pipelines. However, the volumes of water required are likely to be small and therefore the impact is assessed as being of Low significance.

Construction of the Silk Road could result in the release of suspended sediments at watercourse crossings, which would cause turbidity, and in worst cases some reduction in the oxygen content of the water. In the event that the same watercourse was being crossed by the Silk Road and SCP projects the downstream areas of the watercourse may suffer cumulatively from the addition of two suspended sediment loads.

13.8.6 Landscape

The SCP AGIs (ie block valves) will be in addition to the existing BTC pipeline and WREP AGIs. Access routes installed to allow construction traffic to reach the ROW and new AGIs may be retained after construction, and these too will add to the impact on the landscape along the route. The SCP AGIs are generally distinct from the WREP AGIs but coincident with BTC ones. However, through routing the SCP adjacent to the BTC pipeline and WREP, the visual impacts of the pipeline corridor itself are retained within an existing disturbed landscape. Visual impacts arising from SCP proximity to the other pipelines are regarded as being of **Low** significance.

During the construction of the SCP pipeline, there will inevitably be associated short term cumulative impacts to the landscape in the area around the Sangachal Terminal. Impacts to the landscape from construction of the SCP pipeline will last for a much shorter time than those impacts to the landscape from the presence of the Sangachal Terminal, but will be cumulative during the construction period due to the greater area disturbed and are assessed as being of **Low** significance.

The ROW required for construction of each pipeline is 32m. To reduce the area impacted by construction works, it is intended that part of the 32m width for the BTC pipeline is also used as a construction area for the SCP. While the total construction corridor required for both pipelines is 44m, which is greater than for a single pipeline, it does represent an approximate 30% reduction in the width that would normally be required to construct two pipelines separately.

Landscape impacts during construction of both pipelines will result from exposure of top and subsoil in areas of the route, which are normally covered with vegetation. The period over which the central 20m of the ROW is exposed will be extended from a number of weeks or months in a single pipeline installation scenario, to a period of up to 12 months before interim reinstatement is adopted.

There will be a period after reinstatement during which vegetation is recovering and is likely to appear different to the surrounding area, however, this will reduce over a few years and has therefore been categorised generally as a **Low** cumulative visual impact. In areas where vegetation re-establishment is slow, such as the Gobustan semi-desert, this may increase to **Low** to **Medium**.

The SCP pipeline will be laid along the top of some ridges. To lay two pipelines the graded construction width along the top of the ridge will be greater than for one pipeline, the cumulative impact being assessed as Low due to sympathetic profiling of the ridges.

The ROW will be reduced in certain areas to further reduce the cumulative visual impact from the two pipelines. Dual lay within a restricted ROW is proposed for the Mud Volcano Ridge. The

ridges approaching the Azrin and Tovuz Rivers, these rivers themselves, and the Hasansu River crossing are also being considered for dual lay.

Construction access routes will be installed for the BTC pipeline. If SCP construction is to follow, these will be left in place and no new SCP access roads will be required. This can be considered a favourable cumulative visual impact from the construction of the two pipelines along the same route.

13.8.7 Archaeology

The SCP pipeline will pass through areas with the potential to contain significant archaeology. By following the line of the WREP and BTC for the majority of its route, the archaeological potential is better understood and potential impacts from the SCP pipeline have been reduced. The number of potential archaeological deposits impacted by pipeline construction is minimised through parallel alignment of the pipelines. This is a beneficial consequence of the SCP pipeline following the existing pipeline routes.

As the SCP and BTC pipeline will be built within the same construction corridor all pre-construction archaeological excavation work will be of direct relevance to both projects.

13.8.8 Ecology

At the time of construction of SCP, most habitats will have recovered completely from construction of the WREP. Some particular habitats, such as the slower growing semi-desert habitats have not yet fully recovered. Construction of SCP and BTC in these areas will have a cumulative impact in terms of habitat loss. In certain areas such as Gobustan, and the Korchay and Shamkir re-routes the BTC pipeline route does not follow the WREP and therefore in these areas there is not a cumulative impact. Generally the cumulative impact is regarded as being of **Low** significance. The proposed reinstatement mitigation for the SCP pipeline is far more stringent than that employed for WREP.

The Sangachal Terminal area is within the Gobustan semi-desert, which is considered to be a fragile environment within Azerbaijan. The habitats in the immediate vicinity of the terminal have been disturbed both by construction and operation of the terminal and by other anthropogenic causes.

It is likely that the additional disturbance caused by the construction of the SCP pipeline will have a cumulative effect, regarded as being of **Medium** to **High** significance.

Construction of the SCP and BTC pipeline within a combined construction corridor will result in a significant reduction in the cumulative impacts to ecology along the route than would be the case if they were constructed in completely separate working widths.

However, the 20m section of the BTC ROW used for SCP will not be reinstated if SCP closely follows BTC. The viability of the seeds of some plant species in the stripped soil from this section may deteriorate during this interim period, and when the strip is reinstated recovery of the habitats may be slower than for BTC alone.

Impacts to the seedbank in areas such as Gobustan where the soil is thin and the habitat fragile are classified as **High** to **Medium**.

In the case of fauna, (particularly the spur-thighed tortoise and ground nesting birds) the

disruption of two consecutive breeding seasons as a result of sequential construction of the BTC pipeline and SCP gives rise to a greater cumulative impact than the disruption of a single season.

Species whose breeding cycle might otherwise be affected for two consecutive years may benefit from a delay in SCP construction.

The disturbance to riverbanks and beds as a result of SCP and BTC construction is likely to result in cumulative impacts to aquatic flora and fauna through increased sediment disturbance. These impacts will be similar in nature to those described in Section 10 (Environmental Impacts and Mitigation), which are categorised as **Low**, but will be of greater duration.

The construction of SCP and the Silk Road may create a cumulative impact upon some faunal species by increasing the area of permanent habitat loss and duration of the disturbance. However, except for a few crossing points, the geographical area of disturbance will be different.

13.8.9 Traffic

Cumulative impacts of noise and emissions are addressed in previous Sections.

SCP pipeline construction and Sangachal Terminal works will both result in extra plant and personnel vehicles on the roads local to Sangachal. Local traffic flow may be subject to disruption from both projects when the SCP spread is in the Sangachal area, with a corresponding impact upon safety. This is regarded as being of **Medium** significance.

Construction of the SCP in the year immediately following BTC will result in cumulative impacts in the form of an additional period during which construction vehicles are using the road networks. This will extend the period of disruption to the normal flow of traffic.

If the SCP is not constructed immediately following the BTC pipeline, impacts from SCP traffic will be delayed and may be reduced if the construction of the Silk Road has progressed in the interim period and vehicles are able to use this facility. However, this benefit may be offset by the need for demobilisation and remobilisation of construction teams. For whichever construction scenario takes place the cumulative impacts on traffic are assessed to be **Medium**.

The construction contractor is required to leave roads in at least their 'as found' condition following the construction of the BTC pipeline and SCP. The cumulative impact on the state of the roads is therefore negligible.

From the current rate of progress on the Silk Road, it is likely that there will be areas along the SCP route where pipeline and road construction occur at the same time. At such locations there will be elevated levels of traffic from both projects, which will result in cumulative impacts to the normal flow of traffic, and resultant increased likelihood of accidents.

In areas along the SCP route where the Silk Road has already been improved, this will probably result in safer transport of personnel and equipment.

13.8.10 Use of natural resources

Local natural resources used by the projects will include aggregate and water. Access roads will be required at a number of points along the SCP route, and these will be constructed of local aggregate. As the SCP will be built in close proximity to the BTC pipeline the access roads established for that project will be retained and re-used for SCP construction. The associated

cumulative impact is thus minimised.

The cumulative impact will be a small volume of additional aggregate used for maintenance of the access roads constructed for the BTC pipeline. The additional impact of the SCP construction on top of the impact created by BTC pipeline construction will be **Low**. However there will also be a beneficial socio-economic cumulative impact from the purchase of additional local aggregate.

With regard to the use of water along the pipeline construction spreads, cumulative impacts are discussed in Section 13.6.5.

The construction of the Silk Road is likely to produce a high demand on quarries along the route for various grades of aggregate, similar to those required for SCP access routes, and it may be that in some areas demand for the materials is too high for local quarries to cater for. In this case it would be necessary to bring in aggregates from further afield, resulting in increased traffic.

The combined requirements of the Silk Road and the SCP pipeline for aggregates may result in a short-term local shortage of material for other users and/or higher prices.

13.8.11 Employment

80% of the communities surveyed indicated that some inhabitants had construction experience from the WREP. This provides a more highly skilled workforce available for the construction of BTC pipeline than would otherwise be the case. Hence the cumulative impact is positive.

Competition for workers between the SCP pipeline and the Sangachal Terminal, in conjunction with other projects, could result in a temporary shortage of suitably skilled labour in Azerbaijan. This could reduce the local content of SCP pipeline employment (a negative cumulative effect) and/or push up local wages, a beneficial socio-economic effect for local communities. However, given the anticipated employment needs of the SCP project, the significance of this impact is considered to be low. The projects will also contribute further to the development of a greater skills base within the local population, contributing to the overall long-term development of the economy.

Competition will also be greater for the provision of local goods and services. This could both push up the price of supplies, and encourage international contractors to source abroad thus reducing the cumulative economic benefits for Azerbaijan. The creation of the BP Enterprise Centre in Baku to encourage local operators to bid for supply contracts will go some way towards offsetting a potential move to source entirely from abroad and assist local suppliers in managing their supply to more than one project. Requirements in the ITT for contractors to maximise local sourcing will also offset moves to source abroad. The significance of the cumulative impact for Azerbaijan is generally positive. For the construction contractor, it may result in a Low impact.

The combined effect of the BTC pipeline and SCP should be to generally double the inflow of cash into the local economies along the pipeline corridor. This will be achieved through: doubling the length of/number of opportunities for employment for unskilled and semi-skilled labour; doubling the opportunities for the provision of goods and services, and doubling the knock-on effect of having salaried workers living and working close to local villages. In addition, workers who have experience of two projects are more attractive to future employers than workers with experience of one only; opportunities for training and learning new skills for those employed are extended; and, confidence levels are increased (which may encourage some out-migration in search of future employment). Overall these will be a combined positive impact on the state of the local economy.

In the case of training, the knowledge that the second project is following may encourage contractors to train more local skilled and semi-skilled workers, and provide greater overall investment in training for all local workers.

13.8.12 Land and land-based livelihoods

Consultation indicated that a small percentage of landowners felt a level of dissatisfaction with the land acquisition process for the WREP, including concerns over land titles and compensation arrangements. This could potentially result in a greater degree of hostility towards the SCP pipeline and the land acquisition process, although these concerns have been fully integrated and addressed into the preliminary land acquisition process for SCP.

Effective implementation of the land compensation plan outlined in the RAP will go a long way towards avoiding similar problems for SCP, and should mitigate any cumulative impacts for the SCP land acquisition process resulting from prior experience of the WREP.

There is no anticipated cumulative impact on land and land-based livelihoods between SCP and Sangachal Terminal, given the nature of the land and livelihoods in this area. Nomadic herders that use the area will be kept fully informed of project plans.

Cumulative impacts of the SCP and BTC pipeline in terms of land are more complicated. On the one hand, the effect of planning the two projects in parallel will result in reduced impacts had the alternative been to run the two pipelines independently of one another. On the other hand, the effect of constructing SCP after the BTC pipeline will result in some of the land (ie the 20m middle strip) being out of production for at least one if not two or three seasons longer than would have otherwise been necessary. This will result in longer-term impacts for individuals affected by the temporary land take.

Clearly, the greater the gap between the construction of the two pipelines, the greater the impact on the local community if access to the land remains restricted between the two construction periods.

However, the compensation measures outlined in the RAP will ensure that appropriate compensation is calculated to take into account the longer duration of the impact. Hence, there should be no longer term impact on the livelihoods of those affected. The significance of this cumulative impact is therefore **Low**.

The Silk Road construction will require the permanent acquisition of land, and there is the potential that the land owners and users affected by this project will also be affected by the BTC project. A cumulative impact of SCP and the Silk Road project will result if the land acquisition process used for the Silk Road fails to appropriately compensate land owners and land users. This will increase hostility to any projects, including the BTC and SCP projects, where land must be acquired.

The land acquisition and compensation process outlined in the RAP will effectively mitigate issues in relation to the BTC pipeline and SCP only, but will go some way into defining responsibility for the different projects and therefore reducing the possibility of false blame. The cumulative impact should therefore be **Low**.

13.8.13 Infrastructure

Consultation also indicated that a small percentage of consultees felt a level of dissatisfaction with the condition that some of the roads used for WREP construction were left in, once the pipeline was completed. Some communities were concerned that their infrastructure had been severely degraded as a result. The mitigation measures outlined in Section 11.5 (Infrastructure, Services and Natural Resources, and Section 11.6 (Community Relations and Management of Construction Workers) have been designed to minimize construction related impacts.

More development projects running in parallel will put greater stress on local infrastructure particularly roads. The transport management plan will be developed to ensure that the cumulative impact of BTC and terminal operations upon the road network of Sangachal is minimised. Cumulative impact upon other services, including water and electricity, will also be managed.

The effect of two pipelines will result in an increased duration of minor disruptions to infrastructure, for example in terms of temporary road closures, the demand on telecommunications services and use of roads. The mitigation measures outlined in Section 11.5 (Infrastructure, Services and Natural Resources) and Section 11.6 (Community Relations and Management of Construction Workers) have been designed to minimize impacts, and therefore the significance of this impact is low.

With a number of projects being constructed in one region, as with SCP and the Silk Road, it may be difficult to determine which project is primarily responsible for any damage to roads or properties occurring during construction. It is conceivable that the SCP pipeline could be blamed for damage to roads actually caused by other projects, causing difficulties both in terms of compensation and relationships with local communities.

The significance of the cumulative impact will depend on whether or not the two projects coincide in location and in time. If they do, the cumulative impact could, in the short term, be of medium significance, unless it can be effectively mitigated through the community relations programme and liaison with the Silk Road construction management.

13.8.14 Community relations

Communities with previous experience of the WREP construction were generally positive about the idea of having opportunities to profit from a second and possibly third period of pipeline construction. Hence, the cumulative impact of the SCP, the BTC pipeline and the WREP together should be positive.

Increased numbers of foreign workers will result, gradually, in increased exposure of local communities to foreigners. Greater numbers arising in one area as a result of more than one project, for example SCP and Sangachal Terminal, will increase the rate of change. This can be positive where relations with the local community are good, and negative where there are existing difficulties in that relationship. This issue will be managed through the Community Relations Programme outlined in Section 11.6 and supplemented through cooperation between the community relations teams for the SCP, BTC and terminal projects. Hence, the cumulative impact is expected to be **Low**.

A pro-active community relations strategy has been developed to manage community concerns resulting from the BTC pipeline and SCP (Section 11.6.). This will provide the opportunity to revise mitigation measures if required, before the commencement of the SCP construction, based on experience of BTC construction, thus helping minimise any negative cumulative impacts. If

the local communities see direct benefits from the BTC pipeline, the cumulative impact for SCP construction should be positive.

If community relations for the BTC pipeline are well managed, but those of any parallel project are not, the repercussions for community relations between construction workers and local communities in general will be affected. Hence, it will be critical for community relations officers to liaise with any parallel project teams where possible.

13.8.15 Safety

Seventy percent of communities surveyed had direct experience of WREP construction. Hence, those communities are prepared for the temporary disruption associated with pipeline construction, and are aware of the relevant safety issues. Therefore the cumulative impact should be **Low**.

The increasing volume of hydrocarbons transported throughout the region increases the possibility of an oil spill and/or gas explosion, although the likelihood of these events will be extremely low and will be minimised by the adoption of modern safety technologies, practices, and transportation systems. State of the art contingency plans will also minimise the effects of an oil spill or an accidental release of gas in the highly unlikely event that it will occur. Hence, there is no significant cumulative impact.

When considering SCP, additional duration of exposure to pipeline construction sites, including open trenches and construction-related traffic, increases the opportunities for accidents within the local community. The mitigation measures outlined in Section 11, Social Impacts and Mitigation, are designed to reduce the risk of accidents during construction and operation. In addition, the risk for SCP should be lower than for the BTC pipeline as the level of awareness of the potential dangers within the local community should already have been raised. Hence, the cumulative impact should be Low.

Construction and the related risks to safety due to the Silk Road project are expected to be short term close to any one community and therefore it is not anticipated that the cumulative impacts of the Silk Road and BTC projects will be significant.

13.9 BTC PIPELINE AND ENVIRONMENTAL AND COMMUNITY INVESTMENT

13.9.1 Environmental Investment Plan

13.9.1.1 Background

Significant efforts have been taken to avoid areas of high biodiversity, primarily through route selection and careful siting of AGIs (as detailed in Section 4, Project Alternatives and Section 5, Project Description). It is recognised, however that there will be some unavoidable potential impacts on natural habitats. In line with the project policies and to meet the requirements of the World Bank Group on Natural Habitats (Operation Policy 4.04 June 2001), extensive direct mitigation measures aimed at the removal or reduction of potential adverse impacts on natural habitats or their functions have been developed and will be implemented during the project execution. These include measures to restrict conversion (narrowing the ROW in sensitive areas),

and for strategic species retention (translocation of rare species) among others (detailed in Section 10, Environmental Impacts and Mitigation). Additionally, re-instatement practices will also ensure that effects on natural habitats are minimised through adherence to erosion control and bio-restoration standards (See Part 5 of the Technical Appendices for a summary of reinstatement strategy).

In addition to the above direct mitigation and management measures, an Environmental Investment Plan (EIP) is being developed in order to go beyond direct mitigation to meet the company's commitment to maintaining and, where appropriate, enhancing biodiversity.

13.9.1.2 Objectives of the EIP

In recognition of the global importance of the region's biodiversity, the aim of the EIP is to enhance biodiversity management and/or protection primarily through investments in offset projects.

13.9.1.3 Types of environmental investment

Although still in the development stage, it is likely that the EIP will focus on the following areas:

- **Protected areas and species:** The objectives of the EIP will be consistent with those of State protected area development objectives and will explore mutually compatible opportunities with relevant government agencies
- **Areas of high ecological significance outside protected areas:** not all of Azerbaijan's biodiversity resources are contained within the protected areas system. Other areas of high ecological value will also be considered for initiatives under the EIP. Notably, semi-desert habitat protection in Gobustan will be considered in the light of proposals to establish the Gobustan National Park
- **Capacity Building for Biodiversity Management:** The SCP Partners will consider projects that build capacity for biodiversity priority-setting, conservation planning, policy development, and environmental awareness raising in Azerbaijan. This is in recognition of the fact that lack of ecological information and/or its inadequate use is one of the main challenges to biodiversity conservation in the country, and that increased capacity in this area would benefit natural resource managers, planners, policy-makers, scientists, educators, and the public

13.9.1.4 Criteria

The EIP is being developed and will be implemented according to the following principles:

- **Impact:** projects will deliver tangible benefits and, as a minimum, address the 'no net loss' principle
- **Sustainability:** whether short-term or long-term in nature, projects will be designed to deliver lasting benefits
- **Linkages:** where applicable, projects will take into consideration the biodiversity priorities of Azerbaijan. In order to facilitate the success and sustainability of the EIP, linkages will also be sought with the Community Investment Programme
- **Prevention of duplication:** in selecting projects, every effort will be made to avoid duplicating the efforts of other companies, international and local agencies or Government departments; opportunities to leverage existing programmes or projects and co-operate with existing organizations will be sought
- **Participation:** projects will take into account the views, roles and rights of NGOs and

relevant local communities. The needs of local communities in particular will be considered and balanced with the goal of enhancing biodiversity

- **Partnerships:** projects will encourage the development of partnerships between the SCP Partners and a wide range of organisations/civil society
- **Monitoring and Evaluation:** projects will have a strong monitoring and evaluation component in order to ensure lessons are learned and taken into account for existing or future projects. Clear targets and measurements of success for the projects will be identified
- **Transparency:** programmes and projects will be transparent and be open to internal and external scrutiny to allow potential beneficiaries, NGOs and government departments to understand the approach

13.9.1.5 Timeframe

The development of the EIP is being undertaken through consultation with stakeholders to gain an understanding of issues/areas of concern where input would be most valuable. The intention is that potential programmes or projects are developed and implemented in conjunction with relevant stakeholder bodies. Identification of potential partners is underway.

Implementation of the EIP will follow BP's business processes and control procedures for managing project performance and cost.

The programme will be publicised in more detail later in 2002, once feedback on the ESIA has been received and further consultation with authorities, NGOs and affected communities has taken place. It is expected that actual investments will begin in late 2002 or early 2003.

13.9.1.6 Community investment programme

The objective of the community investment programme is to have a positive impact on communities most affected by construction activities by providing direct benefits, engaging with, and adding value, to local communities in a sustainable way. The community investment programme will go beyond the social impact mitigation measures described in the ESIA and move towards BP's goal of having a positive influence in the areas in which BP operates.

There will be two types of community investment projects:

- **Sustainable development projects**, which will be larger scale and longer term in duration and will take place primarily in communities that are directly affected by pipeline activities but may be extended to nearby towns or villages
- **Local community projects**, which are relatively small in scale and duration but respond to an immediate need in those communities that are directly affected by the construction activities

Potential projects will be developed through discussions with the communities themselves, NGOs, international development agencies and government. These discussions will ensure that the programme is not duplicating effort, and allows the company to gain from the experience of NGOs and identify potential implementation partners. Potential projects will be selected on the basis of criteria drawn from international community investment best practice and local experience.

Hence, at the route level, the cumulative effects of the pipeline construction and the community investment activities on the standard of living and quality of life of the local communities will be

positive.

13.9.2 Unplanned events

During the type of construction projects discussed above there exists the potential for accidental events to occur. In the vicinity of the ROW such events include spillage of fuel. The more projects there are, the higher the chance of a spillage occurring. Impacts and mitigation measures described in Sections 10, Environmental Impacts and Mitigation, and 12, Residual Impacts, cover the potential impacts from accidental events.

Perhaps the major cumulative impact would result from an accidental event during operation of the SCP pipeline. The presence of the BTC in relatively close proximity to the SCP pipeline presents a risk, albeit extremely low, of a source of ignition. An explosion occurring in the SCP could result in rupture of the BTC pipeline with subsequent release of large volumes of oil. The impacts and mitigation measures which would be employed in the event of such a release of oil are discussed in Section 10, Environmental Impacts and Mitigation.

MANAGEMENT AND MONITORING

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14 MANAGEMENT AND MONITORING

14.1 INTRODUCTION

SCP Partner's approach to Environmental and Social Management is to apply the key principles of environmental and social protection to all activities for which it is the Operator. These principles include:

- Prior assessment of environmental and social impact
- Minimisation of potential impact through design and other mitigation controls
- Monitoring of effectiveness of controls
- Auditing of performance

This section of the ESIA document highlights how these principles have been applied to the proposed SCP project. It identifies how all the commitments made in this ESIA will be translated into actions in the field and includes a schedule for implementing the actions, through identifying key roles and responsibilities.

The BP Environmental policy (see Section 6) and the SCP Statement of Social Objectives (Figure 14.1) provide a framework for the project as a whole, and particularly for the management and monitoring plans.

Figure 14-1 SCP Statement of Social Objectives

The SCP Project is committed to delivering mutual benefits to communities along the pipeline route and to establishing long-term relationships with these communities, during both the construction and operational phases. We will:

- Minimise potential negative social impacts through identification and mitigation, in particular via a social impact assessment
- Publish regular updates on the environmental and social aspects of the project, and conduct regular dialogue with interested organisations
- Maintain regular contact with communities along the pipeline route through a team of Community Liaison Officers (CLOs) prior to, during and following the construction period
- Compensate for damage to land and property in a legal, transparent and ethical manner that respects the interests of those involved
- Manage expectations on employment opportunities by providing information on the level and duration of employment requirements
- Seek opportunities to increase employment of country nationals, and in particular those in villages along the pipeline route, subject to availability of appropriate skills
- Establish recruitment procedures that are transparent, public and open to all regardless of ethnicity, religion or gender
- Provide periodic training to enhance the skills and capacity of both employees and contractors
- Draw up procedures and management plans for all construction camps, in relation to contacts with local communities
- Provide periodic training on liaison with local communities to all staff employed by the SCP project and contractors
- Establish a community investment programme that delivers mutual benefits to SCP Partners and communities along the pipeline route
- Seek opportunities for communities to mutually benefit from the activities undertaken, and infrastructure required, by the project.

14.2 ENVIRONMENTAL MANAGEMENT SYSTEM

The principal tool that will be employed to coordinate and review the environmental and social performance of the project will be the SCP Environmental Management System (EMS). Social issues will also be addressed within the EMS.

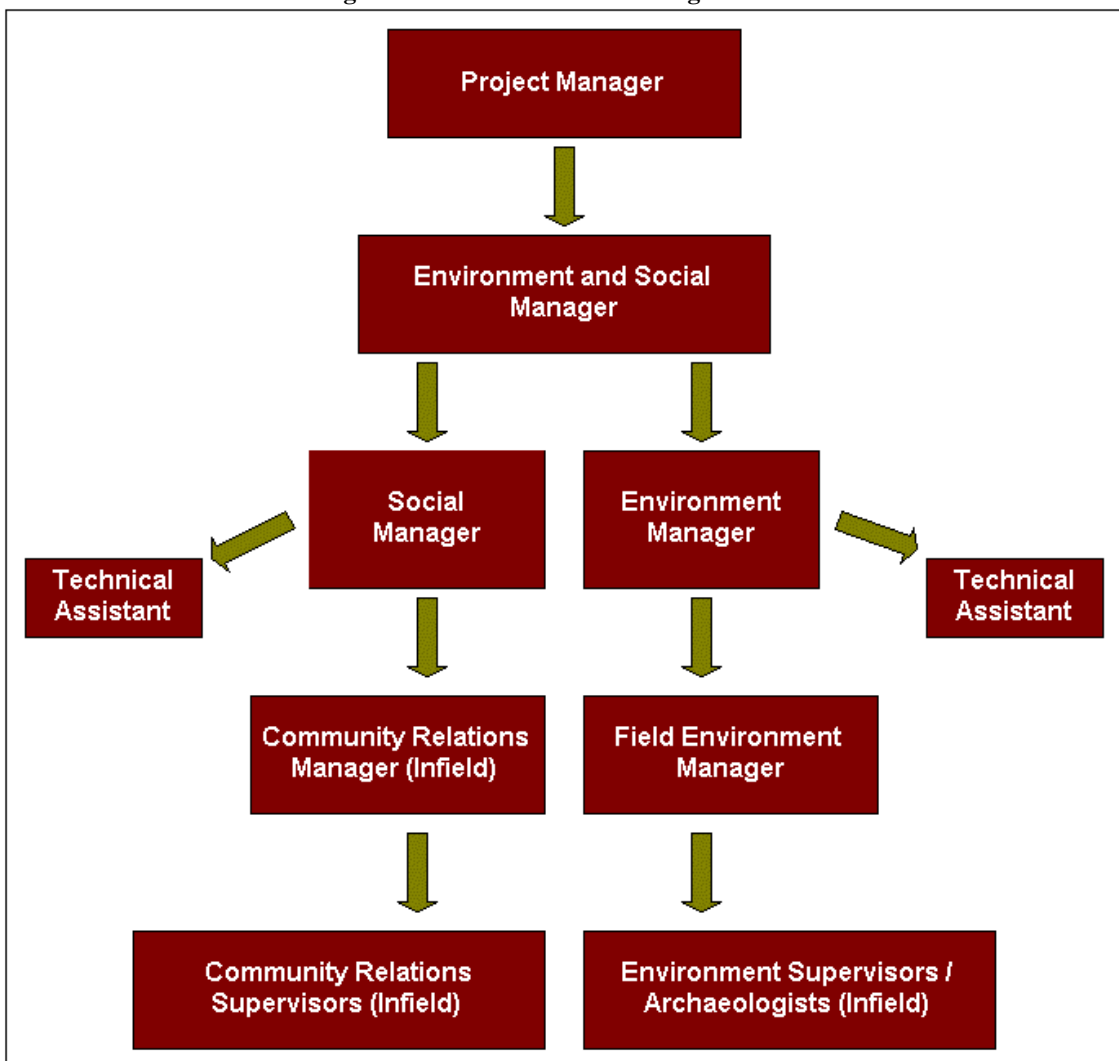
For construction phase, the EMS will be developed at two levels:

- An EMS developed by the construction contractor aimed at managing the environmental and social aspects of construction, within which there will be a series of environment and social management plans for each different issue area
- An overarching EMS developed by the Project principally aimed at providing assurance that the construction contractor is complying with the environmental and social requirements defined by the Project, including those specified in this ESIA. Key elements include: development and dissemination of a project specific environmental and social policy; development and implementation of environmental and social

management plans; and ongoing monitoring and development of each element of the EMS through a programme of regular review and continual improvement

The SCP partners will establish a resource structure for the management of environmental and social issues during the construction and operation of the SCP project. One possible organisation structure is shown below. This organisation is indicative of the level of resources that will be devoted to the management of environmental and social issues, but has not been finalised.

Figure 14-1 Indicative Resourcing Structure



For operational phase, the Project will develop a specific operational EMS.

14.2.1 Overview of Environmental & Social Management Plans

The effective implementation of the EMS is based on the development and implementation of a number of environmental and social plans.

A summary of the environmental and social plans is presented in Table 14-2. The plans are described in terms of their purpose and objectives, anticipated date for completion, and the responsible party (either SCP Partners or the Construction Contractor) for development and implementation of the plan.

In some cases draft plans have already been developed and included in the appendices for reference. These include the Reinstatement Summary Plan and the Cultural Heritage Management Plan. Whilst the SCP Project has developed these draft Plans, it is largely the responsibility of the construction contractor to effectively implement them. SCP Partners will maintain a strong audit and overview role to ensure that the construction contractor implements the requirements of the Plans appropriately and effectively.

In other cases, measures for inclusion in the plans have been partially developed and must be finalised in conjunction with the construction contractor. The “frameworks” for these plans have been provided in this section and detail the objectives, principles, standards to be met, resources and general requirements. These frameworks include the: Community Safety Management Plan; Community Liaison Management Plan; Construction Camp Management Plan; Infrastructure and Services Management Plan; Procurement and Supply Management Plan; Employment and Training Management Plan; Resettlement Action Plan; Waste Management Plan; Pollution Prevention Management Plan; Transport Management Plan. Additional draft measures that have been developed based on the ESIA mitigation measures will be provided to the construction contractor to include in the development of the full plan.

SCP Partners will review and approve these plans following their development by the construction contractor. The construction contractor is then responsible for their implementation with SCP Partners maintaining a strong overview and monitoring role.

A number of plans will be fully developed prior to operations phase and include the Emergency Response Plan.

Table 14-2 List of environmental and social plans specific to the project

Plan Name	Text Reference	Purpose and Objectives of Plan	Date for Completion	Responsibility for Plan Development and Implementation
Community Safety Management Plan	Section 14.3.1	Outlines specific actions for the construction contractor & SCP Partners to ensure safety of communities along the route	<p>A framework plan has been developed.</p> <p>The Construction contractor is to build on this framework and finalise the plan prior to construction.</p> <p>A similar plan will be drawn up by SCP Partners for the operations phase.</p>	<p>Construction contractor is responsible for development and implementation of the Community Safety Management Plan for construction phase, based upon the framework provided in this section.</p> <p>SCP Partners responsible for development and implementation of the Plan during operations phase.</p>
Community Liaison Management Plan	Section 14.3.2	Outlines specific actions for the construction contractor and SCP Partners to ensure positive community relations	<p>A framework plan has been developed (Section 14.3.2). The Construction contractor is to build on the framework and finalise Plan prior to construction.</p>	<p>The Construction contractor is responsible for development and implementation of the final Plan for construction phase, based upon the framework provided in this section.</p> <p>SCP Partners responsible for development and implementation of the Plan during operations phase</p>
Construction Camp Management Plan	Section 14.3.2	Ensure effective management of construction camp with regards to community relations and other potential impacts of the camps (eg on natural resources, roads etc).	<p>This plan is negotiated during bid proposal stage. A framework plan has been developed in this Section (14.3.2). The Construction contractor will build on this framework and finalise the Plan prior to construction</p>	<p>The Construction contractor is responsible for development and implementation of the final Plan for construction phase, based upon the framework provided in this section</p>

Table 14-2 List of environmental and social plans specific to the project

Plan Name	Text Reference	Purpose and Objectives of Plan	Date for Completion	Responsibility for Plan Development and Implementation
Infrastructure and Services Management Plan	Section 14.3.3	Sets out specific actions for the construction contractor and SCP Partners, to minimise the disruption & negative impact associated with infrastructure, natural resources, households and community assets eg, land, roads, irrigation, etc	A framework plan has been developed within this Section. The Construction contractor is to build on the framework and finalise the Plan prior to construction.	The Construction contractor is responsible for the development and implementation of the Plan for construction phase based upon framework provided here in this section SCP Partners responsible for development and implementation of the Plan during operations phase.
Employment and Training Management Plan	Section 14.3.4	Sets out specific actions for the construction contractor and SCP Partners to ensure opportunities for local employment are maximised and that there is a fair distribution of jobs. The Plan also aims to manage the skills development and training process to ensure local communities can benefit from this project in the longer term.	A framework plan has been developed in this section. The Construction Contractor is to build on the framework and finalise the Plan prior to construction.	The Construction Contractor is responsible for the development and implementation of the Plan based upon the framework provided here in this section. SCP Partners responsible for development and implementation of the Plan during operations phase.

Table 14-2 List of environmental and social plans specific to the project

Plan Name	Text Reference	Purpose and Objectives of Plan	Date for Completion	Responsibility for Plan Development and Implementation
Procurement and Supply Management Plan	Section 14.3.5	Sets our specific actions for the construction contractor and SCP Partners to ensure opportunities for sourcing goods and services from local and national businesses is maximised.	This plan is negotiated during bid proposal stage. A framework plan has been developed in this Section (14.3.5). The Construction contractor will build on this framework and finalise the Plan prior to construction	The Construction Contractor is responsible for the development and implementation of the Plan based upon the framework provided here in this section.
Transport Management Plan	Section 14.3.6	Sets out specific actions for construction contractor to properly manage traffic and it's potential impacts, including safety and accidents.	A framework plan has been developed in this Section. The Construction Contractor is to build on the framework and finalise the Plan prior to construction.	The Construction Contractor is responsible for the development and implementation of the Plan during construction phase based upon the framework provided here in this section. SCP Partners is responsible for development and implementation of the Plan during operations phase.
Resettlement Action Plan	Section 14.3.7	Sets out the principles, process and specific actions related to land acquisition and compensation. s	Prior to construction.	SCP Partners to develop and implement Plan
Cultural Heritage Management Plan	Section 14.3.8	Outlines strategy and actions to avoid and/ or minimise project impacts to archaeological and historic monument sites	Draft plan provided in Part 2 of the Baseline Reports Appendices	Construction contractor to implement requirements of draft plan. SCP Partners. to monitor implementation of the plan.

Table 14-2 List of environmental and social plans specific to the project

Plan Name	Text Reference	Purpose and Objectives of Plan	Date for Completion	Responsibility for Plan Development and Implementation
Re-instatement Summary Plan	Section 14.3.9 Part 5 of the Technical Appendices	This Summary outlines the actions that contractor will take to implement the Reinstatement Specification (a contractual document) and achieve the reinstatement targets for erosion control and bio-restoration.	The Reinstatement Specification has been completed and provided to potential Construction Contractors. A summary of this specification, the Reinstatement Summary Plan is provided in Part 5 of the Technical Appendices.	The Construction contractor is responsible for development of the final reinstatement Plan, including method statements describing how the requirements of reinstatement specification will be implemented
Pollution Prevention Management Plan	Section 14.3.10	Sets out specific actions for the Construction Contractor and SCP Partners to ensure that polluting emissions and disturbance are prevented or mitigated	A framework plan has been developed in this Section. The Construction Contractor is to build on the framework and finalise the Plan prior to construction	The Construction Contractor is responsible for the development and implementation of the Plan based upon the framework provided in this section. SCP Partners is responsible for development and implementation of the Plan during operations phase.

Table 14-2 List of environmental and social plans specific to the project

Plan Name	Text Reference	Purpose and Objectives of Plan	Date for Completion	Responsibility for Plan Development and Implementation
Waste Management Plan	Section 14.3.11	Outlines specific actions for the construction contractor and SCP Partners to ensure that best practice waste management procedures are implemented.	Within six months of Construction Contractor mobilisation and three months before construction starts A framework plan has been developed in this section. The Construction Contractor is to build on the framework and finalise the Plan prior to construction	The Construction Contractor is responsible for the development and implementation of the Plan for construction phase, based upon the framework provided here in this section. SCP Partners is responsible for development and implementation of the Plan during operations phase.
Emergency Response Plan	Section 14.3.12	Sets out specific actions for construction contractor and SCP Partners to ensure that incidents, including fire and those involving spillage of chemicals or oil, are properly managed during both construction and operation	A framework plan has been developed in this Section. The Construction Contractor is to build on the framework and finalise the Plan prior to construction.	The Construction Contractor is responsible for the development and implementation of the Plan during construction phase based upon the framework provided here in this section. SCP Partners is responsible for development and implementation of the Plan during operations phase.

The following sections describe the objectives, accountability, and resources required for the various plans in more detail.

14.3 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLANS

14.3.1 Community safety management plan

14.3.1.1 Introduction

Project health and safety will be managed in accordance with SCP Partner's HSE Policy as outlined in Section 6. The following framework addresses specific safety aspects only in so far as they have an impact on communities (as well as livestock) and external 3rd parties and has been developed through the ESIA process. The construction contractor will then be responsible for the development of the full Community Safety Management Plan. The final plans prepared by the contractor will require review and approval by SCP Partners. There will be an overlap between this plan and many of the other management plans, particularly the Infrastructure and Services Management Plan.

14.3.1.2 Objectives and targets

The following community safety objectives have been defined:

- To ensure the safety of community members is not affected by pipeline construction or operation
- To generate safety awareness in local communities to ensure they are pro-active in managing their own safety with regard to the pipeline
- To minimise the spread of diseases in local communities, particularly HIV/AIDS and other STDs

In line with these objectives, specific targets will be set and negotiated with the construction contractor. For example, a target is likely to be set around ensuring no major health or safety incidents affecting community members.

14.3.1.3 Accountability

The SCP Construction Manager will be accountable for providing assurance during the construction phase that the above objectives and agreed targets are met. The construction contractor will have primary responsibility for the implementation of the measures during the construction phase. Accountability during the operations phase will be with the SCP Operations Manager.

14.3.1.4 Reporting

The construction contractor will report to the SCP Health and Safety manager on a regular basis. These reports will advise SCP Partners on the projects performance against a range of health and safety metrics, including health and safety training; tool box talks, health screening, incidents, etc. Any incidents concerning community members will be reported. Major health and safety incidents such as fatalities or serious accidents will be reported to SCP Partners immediately.

The SCP Health and Safety manager will have responsibility for monitoring activities during both construction and operation.

14.3.1.5 Resources

The contractor's community liaison team and construction engineers, with the assistance of the SCP project community relations team, will implement community safety measures. The engineers will assist with technical details and on specific construction measures. These measures are in addition to the project general health and safety requirements and standards.

14.3.2 Community Relations Plans

This section relates to two plans which both have a community relations focus:

- Community Liaison Management Plan
- Construction Camp Management Plan

14.3.2.1 Introduction

The Community Liaison Management Plan and Construction Camp Management Plan are a critical element of effective social impacts management. For any project of this size, there is potential for unexpected situations to arise that will need to be resolved if relationships between communities, the construction contractor and ultimately SCP Partners are to remain positive and mutually beneficial. The focus of this plan will be the successful management of the construction workers and construction camps in terms of their interface with the community. However, it will also include community liaison measures for the operational phase of the pipeline. The Construction Camp Management Plan will also include measures that relate to other social impacts such as management of local infrastructure and natural resources.

14.3.2.2 Objectives

The overarching objective for the community liaison and community relations teams is to build a positive, non-dependent relationship between the project participants and the local communities. This will be the basis of strong relationships during the operational period. These relationships should be based on open communication and mutual respect.

The Objectives of the Community Liaison Management Plan and Construction Camp Management Plan are to define actions, responsibility and timing in order to:

- To provide communities affected by the project with regular information on the progress of work and the implications for these communities
- To inform the SCP project team and contractors of any community related issues that may impact on construction
- To monitor implementation of mitigation measures and the impact of construction via direct monitoring and feedback
- To identify any significant new issues that may arise during the construction period
- To manage any disputes between the Project Participants/contractor and communities
- To assist in identifying opportunities for construction activities to deliver benefits to local communities

In line with these objectives, specific targets will be set and negotiated with the construction contractor.

In addition to these objectives, the Construction Camp Management Plan aims to manage workers housed in camps and will include a Code of Conduct, Camp Rules and an outline of camp training as well as specific measures such as camp security and limits on worker movements at night time.

14.3.2.3 Accountability

The Construction Contractor community liaison team and a SCP project community relation team will be appointed. As a minimum, the teams will be established as follows (Table 14-2), although the exact make up and numbers will be based on the construction schedule defined by the contractor, following award of contract:

Table 14-3 Community Liaison Teams

Company	Management	Spread 1	Spread 2⁽¹⁾	Construction Camps	Total
Construction contractor Community Liaison Team		1	1	2	4
SCP Community Relations Team	1	0	0	4 (Supervisors – also responsible for Community Investment)	5

The SCP Project Manager will be accountable for ensuring that the above objectives are met and may set additional targets in these areas as an incentive to implementation of the various measures.

The construction contractor will have primary responsibility for community liaison, and will be the first point of contact with affected communities. This will be achieved by allocating specific responsibilities to staff, and by a team of dedicated Community Liaison Officers (CLOs), one of whom will be designated as the Lead CLO. This individual will have overall responsibility for the following:

- Implementation of the Community Liaison Management Plan and the community outreach aspects of the Construction Camp Management Plan and Transport Management Plan.
- Training of all contractor staff with community liaison responsibilities.
- Communication with communities affected by the project.
- Provision of weekly and monthly reports to SCP Partners
- Management of CLOs to carry out roles listed below.

The construction teams in each spread will be working along an approximately 15-kilometre length at any one time. One CLO will therefore be required on each spread to liaise with communities along the pipeline route. Their role will be to:

(1) If only one spread is used, only 1 pipeline spread CLO will be necessary.

- Meet community leaders and speak at community meetings prior to arrival of construction teams in a given locality, to inform them of the nature and length of activities in their area
- Hold fortnightly (or as required) meetings with leaders and communities while construction teams are present in their area
- Liaise with the contractor staff who have responsibility for community liaison in each work team
- Provide a focus for negotiation and resolution of specific disputes with communities if / when they arise, using the dispute resolution procedure
- Provide weekly updates to the contractor SCP Community Relations Manager
- Liaise with the management of the spread team on major issues arising, and provide feedback to communities on responses to these issues

There will also be CLOs working in the construction camps, and they will have responsibilities for community liaison.

- Hold regular meetings with communities throughout the lifetime of the camp
- Support implementation of the Construction Camp Management Plan (to be developed by the construction contractor for bid proposal and agreed through contract negotiations)
- Advise the lead CLO, and construction camp management, on changes required to the Construction Camp Management Plan
- Meet with communities close to smaller camps and AGIs on a monthly basis, and advise contractor management, and the lead CLO on issues arising from these meetings
- Produce fortnightly reports on implementation of the camp management plan, specific incidents, and action taken to address community concerns

Further detail on the roles and responsibilities of the Contractor's liaison team and the SCP Community Relations Team can be found in the PCDP (Part 8 of the Technical Appendices).

14.3.2.4 Reporting

The reporting structure is as outlined above with weekly and fortnightly reports submitted by the CLO team to the SCP project community relations team.

14.3.3 Infrastructure and services management plan

14.3.3.1 Introduction

The Infrastructure and Services Management Plan will set out the specific actions required to minimise the disruption and negative impacts for all communities services and infrastructure. This includes actions to minimise disruption to infrastructure and natural resources, as well as measures to avoid damage to household and community assets such as land, houses, roads, irrigation networks, etc. Many of the actions within the Infrastructure and Services Management Plan are continuous, ie, they will need to be implemented with each new community or settlement along the route. This framework plan provided below has been developed during the ESIA process. A more detailed plan will be developed by the Construction Contractor, incorporating the requirements of the framework plan below. The final Plan will be require review and approval by SCP Partners.

14.3.3.2 Objectives

The objectives of the plan are to define actions, responsibility and timing in order to:

- To minimise damage to community and household assets from the construction process
- To ensure 'No Net Loss' to community infrastructure, services and natural resources as a result of construction and operation

In line with these objectives, specific targets will be set and negotiated with the construction contractor.

14.3.3.3 Accountability

SCP Partners will be accountable for ensuring that the above objectives are met. The construction contractor will have primary responsibility for implementation during construction, but the responsibility will fall back to SCP Partners during operation. The Community Liaison team will have additional responsibility for the implementation of some of the measures.

14.3.3.4 Monitoring and review

SCP Partners will have responsibility for monitoring activities during both construction and operation.

14.3.3.5 Resources

It is proposed that the engineering teams for the construction contractor and SCP Partners will be able to implement measures detailed within the Infrastructure and Services Management Plan with the assistance of the community liaison team employed for the project. Community liaison staff will be able to advise communities of any measures that are proposed and seek feedback where necessary on their implementation, either to advise the engineers on modifications needed, or to provide a report to SCP Partners on the effectiveness of measures in minimising the social and economic impacts.

14.3.4 Employment and training management plan

14.3.4.1 Introduction

The Employment Management Plan is vital to maximising the opportunities for local employment and ensuring a fair distribution of jobs to communities along the route. The plan will also include measures to manage the training to be provided to local workers. The construction contractor is responsible for preparation and implementation of the final Employment and Training Management Plan, and will incorporate the requirements of the framework as described below. The final plan will require review and approval by SCP Partners.

14.3.4.2 Objectives

The objectives of the plan are to define actions, responsibility and timing in order to:

- Maximise local employment in skilled, semi skilled and unskilled categories during construction and operation of the SCP, where practical, without compromising safety
- Ensure that unskilled jobs are filled from pipeline affected communities
- Ensure a fair distribution of jobs between pipeline affected communities along the route
- Provide a fair and transparent recruitment process
- Enhance the local skills base through training provided during employment

14.3.4.3 Accountability

The SCP project team will be accountable for ensuring that the above objectives are met and will set targets in these areas. The construction contractor will have primary responsibility for the implementation of these measures during construction, but the responsibility will fall back to SCP Partners during operation.

14.3.4.4 Monitoring and review

SCP Partners will have responsibility for monitoring activities during both construction and operation.

14.3.4.5 Resources

It is proposed that existing staff resources for the construction contractor and SCP Partners will be able to implement these measures with the assistance of the community liaison team employed for the project. This team will be able to help the construction contractor to run employment recruitment at district level (eg, through district level recruitment centres). SCP Partners will also need to supply a member of staff during local level recruitment along the route to act as an independent figure monitoring the fairness of the recruitment process.

14.3.5 Procurement and supply management plan

14.3.5.1 Introduction

SCP Partners aim to maximise the quantity of goods and services that are supplied by both local and national businesses to the project and to promote the efficient use of resources. This will be contingent on whether local suppliers can offer sufficient quality and reliability and can meet the stringent standards. This Plan will help SCP Partners and the Construction Contractor to identify goods and services that will be suitable to local suppliers and to implement measures designed to improve the capacity of local businesses to respond to these opportunities. The plan will build on existing SCP Partners supplier programmes (eg, supplier seminars).

14.3.5.2 Objectives

The objectives of the plan are to define actions, responsibility and timing in order to:

- Promote opportunities for local sourcing of goods and services
- Build capacity of local suppliers to meet contracting opportunities
- To promote the efficient and sustainable use of natural resources
- Minimise the procurement and storage of potentially hazardous materials
- Promote the adoption of good environmental and social practices by suppliers

14.3.5.3 Accountability

The SCP Partners team will be accountable for ensuring that the above objectives are met and will set targets in these areas. The construction contractor will have primary responsibility for the implementation of these measures during construction, but the responsibility will fall back to SCP Partners during operation.

14.3.5.4 Monitoring and review

SCP Partners will have responsibility for monitoring activities during both construction and operation.

14.3.5.5 Resources

Existing procurement resources within the construction contractor will be able to implement the Procurement and Supply Management Plan with the assistance of the community liaison team and the SCP Partners team managing existing supplier programmes.

14.3.6 Transport management plan

14.3.6.1 Introduction

The Transport Management Plan is required in order to minimise the negative impacts and enhance any positive impacts, due to project-related traffic (both rail and road) on all communities affected by construction and subsequent operation of the SCP. This includes actions to minimise disruption to the existing road infrastructure, communities adjacent to the road network and natural resources, as well as measures to avoid damage to household and community assets such as land, houses, irrigation networks, etc. Many of the actions within the plan are continuous, ie, they will need to be implemented along the route.

The Construction Contractor is responsible for preparation and implementation of a Transport Management Plan. A framework relevant to social and environmental aspects associated with transport activities is presented below. The requirements of the framework will be incorporated into the final Plan prepared by the Construction Contractor. The Plan is required to be reviewed and approved by SCP Partners.

14.3.6.2 Objectives of plan

The following social and environmental objectives have been developed in relation to assist transport management:

- To provide communities affected by traffic (both rail and road) from the SCP project with sufficient information on the effects of the project-specific traffic and the opportunity to resolve traffic related complaints
- To ensure limitations on the size, number, frequency and timing of project-related vehicles on specific roads are set to minimise negative impacts on communities and the surrounding environment
- To control hazards associated with project-related traffic through project speed limits, driver training, journey management and appropriate signage

- To reduce impacts on the environment through effective emissions control, high standards of vehicle maintenance, adherence to relevant standards including noise emissions and defined working hours
- To review the effectiveness of the Transport Management Plan and revise the mitigation measures employed, if necessary

In order to achieve these objectives the Plan will address, as a minimum, the following:

- Vehicle sizes and schedule of movements
- Vehicle standards (axle weights, noise limits, etc)
- National traffic procedures
- Local traffic procedures
- Mobilisation/demobilisation of heavy equipment
- Description on the transport of pipe
- Liaison with local communities
- Management of transport contractors
- Management and resolution of traffic -related complaints
- Access confined to demarcated working areas
- Road capacities and define approved routes for specific categories of vehicle
- Strict enforcement of project speed limits
- Driver environmental and safety awareness training
- Journey management planning
- Effective maintenance to minimise vehicle emissions & fuel consumption
- Warning signs at road crossings
- Ensure a high standard of vehicle maintenance
- Regular maintenance of plant and equipment to meet relevant standards
- Use of silencers
- Defined working hours
- Responsible use of vehicles
- Procedure for informing local residents of noisy activities

14.3.6.3 Accountability

Prior to commencing any site work, the Contractor will develop a project-specific Transport Management that will cover both contractor and SCP Partners transportation during construction. The Contractor's performance will be monitored by the SCP Project Manager or delegate.

14.3.6.4 Monitoring & review

The Construction Contractor will prepare weekly reports presenting the monitoring of compliance with the Transport Management Plan. The SCP Project Manager or his delegate will audit the activities of the Contractor at least every six months.

14.3.6.5 Resources

The Contractor will be responsible for the Transport Management Plan. Additional resources may be required in complex situations and these will be provided by the Contractor. This situation may arise in situations where community liaison is a particularly requirement. In this

case the resources identified in the community relations plans (Section 14.3.2 above) will be employed.

14.3.7 Resettlement action plan

A Resettlement Action Plan is currently being produced (see summary in Section 11.4) and will be released as a public document in third quarter 2002. It will define the following:

- Indicators and performance measures that will be used in conjunction with objectives defined below to assess progress and the effectiveness of Resettlement Action Plan mitigation actions.
- Monitoring activities to be taken by the Project (internal monitoring)
- Monitoring activities to be undertaken by an independent third party (external monitoring)
- Reporting requirements
- Monitoring schedule (frequency and duration of monitoring activities)

Monitoring activities are an important aspect of this Plan. The monitoring will help keep stakeholders informed of SCP Partner's performance with respect to delivery of the commitments and actions described in the Plan.

14.3.7.1 Objectives

Objectives of the plan are:

- Timely and effective delivery of the commitments and actions described in the Resettlement Action Plan
- Disbursement of compensation in accordance with agreements
- Affected lands are adequately reinstated for appropriate use
- Effective delivery of measures to offset any adverse project impacts on land use, income levels or productivity
- Pre-project living standards and income levels are sustainably restored.
- That grievances expressed by project affected people are followed up and, where necessary, corrective action is implemented
- Monitor any dispute that cannot be resolved by the grievance system as it progresses
- That project affected people understand the resettlement process and their rights and avenues for complaint
- Any cases of hardship are identified and, where necessary, additional support is provided

14.3.7.2 Accountability

SCP Partners will have overall responsibility for ensuring that resettlement commitments are met and that other parties (involved government agencies, construction contractor, other project staff, consultants) fully understand their roles and responsibilities.

14.3.7.3 Monitoring and review

SCP Partners will have overall responsibility for monitoring implementation of the Resettlement Action Plan. Mechanisms for independent third party review are presently being discussed with

IFIs. Detailed monitoring arrangements will be described in the forthcoming Resettlement Action Plan.

14.3.7.4 Resources

Resources and budgets for land acquisition and resettlement monitoring will be outlined in the Resettlement Action Plan. To implement monitoring, the project will draw on some or all of the following:

- SCP Partner's community liaison staff and land acquisition team
- Construction contractor's community liaison staff
- In-country NGOs
- Third party resettlement specialists

14.3.8 Cultural heritage management plan

14.3.8.1 Introduction

A draft Cultural Heritage Management Plan has been drawn up as part of this ESIA (Part 2 Baseline Reports of the Appendices) and will be implemented by the Contractor in order to minimise the negative impacts and enhance any positive impacts due to construction of the SCP. The plan builds on work completed and ongoing as part of the ESIA process. For example initial baseline surveys along the proposed SCP route have highlighted significant archaeological sites.

Local alterations to the route line or width of the working corridor have been incorporated throughout the design programme and further modifications are likely to be made in the future.

14.3.8.2 Objectives

The following are the objectives of the Cultural Heritage Management Plan:

- Conservation during the lifetime of the SCP project, protection of sites in the vicinity of construction activities wherever required, provision of access tracks
- Pre-Construction, agree minor re-routes where possible
- During Construction, undertake archaeological digs

In order to address these objectives the Cultural Heritage Management Plan will address as a minimum the following:

- Training for Contractor staff
- Protection of sites in the vicinity of construction activities by demarcation fences
- Protect of sites through ensuring access tracks to new or existing facilities are carefully sited
- Respect the cultural heritage of the areas in which work is carried out.
- Mechanism for agreeing stopping work in the encountering a potential archaeological site during ROW clearance or excavation activities
- Mechanism for agreeing minor re-routes where possible
- Mechanism for agreeing "skipping" sections

- Identify sites requiring further investigation
- Complete all digs during the construction phase wherever possible

14.3.8.3 Accountability

BP is employing research teams consisting of specialist contractors to implement the different phases of the Cultural Heritage Management Plan (Part 2 Baseline Reports of the Appendices).

14.3.8.4 Reporting

A report will be prepared prior to the start of construction in any new length of activity detailing the specific Cultural Heritage Management Plan activities to be employed. In order to ensure that the Cultural Heritage Management Plan is effective and reduces unnecessary delays to construction activity to a minimum there will be clear lines of communication between the Cultural Heritage Management Plan contractors (Part 2 Baseline Reports of the Appendices) and the SCP Project Manager or his delegate and weekly reporting of compliance with the Plan.

The SCP Project Manager or his delegate will audit the activities of the Plan contractors at least every 6 months.

14.3.8.5 Resources

The Cultural Heritage Management Plan contractors will be responsible for the plan. Additional resources may be required in complex situations and these will be provided by the SCP Partners.

14.3.9 Reinstatement Summary Plan

14.3.9.1 Introduction

A summary of the reinstatement specification, the Reinstatement Summary plan is presented at Part 5 of the Technical Appendices. This specification is the document that outlines, in a contractual sense, the principles and the targets for erosion control and bio-restoration. The contractor will develop additional specific methods statements and procedures that will detail how the goals outlined in the specification will be met and incorporate these to develop a final Reinstatement Management Plan.

14.3.9.2 Objectives

The Reinstatement Management Plan will outline actions, responsibilities and timing in order to:

- Protect top soil
- Stabilize the ROW
- Restore faunal and floral habitats
- Dispose of spoil appropriately
- Avoid impacts due to side slope cuts

14.3.9.3 Accountability

The final Reinstatement Management Plan, including Method Statements, Inspection Plans and Record Portfolios for all erosion control and reinstatement works will be produced by the Contractor for approval by the SCP Project Manager. The Contractor is responsible for the implementation and audit of the effectiveness of the Plan. The Contractor's performance will be monitored by the SCP Project Manager, or delegate, on at least a monthly basis.

14.3.9.4 Reporting

A report will be prepared prior to the start of construction in any new area. The report will detail the specific reinstatement activities for that area. A report will be prepared on completion of construction activity in the area and annually thereafter or until reinstatement is agreed to be complete by the SCP Project Manager or his delegate.

14.3.9.5 Resources

The Contractor will be responsible for implementation of the Plan. Additional resources may be required in complex situations and these will also be provided by the Contractor.

14.3.10 Pollution prevention management plan

14.3.10.1 Introduction

The contractor will develop a Pollution Prevention Management Plan. It will detail the manner by which polluting emissions and disturbance associated with the project are to be prevented or mitigated. A framework for the plan is provided below. The final plan prepared by the contractor, incorporating the requirements of the framework below, and will require review and approval by SCP Partners.

14.3.10.2 Objectives of plan

The following are the objectives of the Pollution Prevention Management Plan:

- To identify potential pollutants
- To provide proposals for bunding and lining of storage areas
- To provide procedures for transporting, handling, storing, using and disposing of pollutants
- To provide procedures for training and competence of operators
- To provide refuelling procedures
- To provide solid and waste water management
- To describe the proposed measures to prevent spillages and pollution to land and water
- To provide spatial and temporal constraints required adjacent to watercourses, etc
- To Protect local water supplies
- To provide source and discharge procedures for hydrostatic test waters
- To provide procedures for the control of noise pollution
- To provide procedures for the control of dust and mud
- To address transport disturbance
- To provide procedures to control of blasting operations

- To provide a list of pollution control equipment

A key aspect to be covered within the Pollution Prevention Management Plan is the management of hazardous waste material. Whilst it is not anticipated that significant amounts of hazardous waste materials will be generated, specific procedures to address hazardous materials will be developed.

At a minimum, the procedures specific to hazardous materials will include measures to ensure that:

- The physical and chemical properties of the materials are understood and that appropriate measures are in place to mitigate the hazards posed by them both to humans and the environment (eg, segregation of potentially reactive materials, maintenance of hazardous materials logs, provision of Material Safety Data Sheets for all stored materials)
- The volumes of hazardous materials purchased and stored by the project at any one time is minimised
- The design of fuel and hazardous material storage areas includes measures designed to minimise the potential for spillages and to ensure that spillages can be contained (eg, fuel tanks will be provided within concrete-lined, bunded containment areas, hazardous material storage areas will be furnished with a dedicated surface water drainage system that is isolated from the general storm water system)
- Diesel fuel day tanks have adequately sized vent lines terminating in the open air and at an elevation where overfilling will not cause tank rupture
- Temporary tanks and fixed engines are provided with a properly drained drip tray
- Discharge lines from all tanks are fitted with shut off devices capable of being operated from a safe position, ie outside the area where the tank is located
- Accessible level indicators are fitted to the storage tanks
- There is no storage of hazardous materials in flood plains or within 30m of a watercourse
- Storage of hazardous materials in areas of known groundwater vulnerability is avoided
- Storage of hazardous materials is in designated hazardous storage areas

14.3.10.3 Accountability

Prior to commencing any site work, the Construction Contractor will develop the Pollution Prevention Management Plan. The Contractor is responsible for the implementation and audit of the effectiveness of the plan. The Contractor's performance will be monitored by the SCP Project Manager or delegate.

14.3.10.4 Monitoring & review

A report will be prepared prior to the start of any construction detailing the specific pollution prevention management measures.

Weekly reports will present the monitoring of compliance with the Pollution Prevention Management Plan. These reports will be prepared by the Contractor for submission to the SCP Project Manager or delegate. The SCP Project Manager or his delegate will audit the activities at least every six months.

14.3.10.5 Resources

Additional resources may be required in complex situations and these will be provided by the SCP Partners. This situation may arise where community liaison is a particularly requirement.

14.3.11 Waste management plan

14.3.11.1 Introduction

Waste management plans will be developed for both the construction and operational phases of the project.

The construction contractor will be required to develop a construction specific waste management plan prior to the start of the construction work.

Upon completion of the commissioning phase, the Operations Waste Management Plan will be required.

It is expected that the operator will adopt some of the third party agreements made by the construction contractor as long-term disposal routes. It is also anticipated and that some or all of the waste handling/treatment/disposal facilities established during construction will be adopted for operational use.

14.3.11.2 Objectives of plan

The following are the objectives of the Waste Management Plan:

- To provide a consolidated summary of the various regulations and restrictions governing the generation, handling, treatment and disposal of wastes generated during the construction/commissioning phases of the project
- To provide any permitting requirements for waste treatment or disposal
- To provide detailed method statements for each element of the waste management handling, treatment and disposal process
- To identify any third party agreements for waste transfer or handling
- To provide proposals to audit waste management operations
- To identify responsible use of materials to minimise waste
- To specify requirements for monitoring of compliance with the plan to reduce visual impact from waste site
- To enforce strict duty of care on the project managers and the contractors
- To establish secure waste storage in defined areas away from watercourses, drains and aquifers and secure from vermin
- To prohibit of uncontrolled burning or burial waste
- To identify the requirements for the environmental review of potential landfill & incinerator sites including site selection & proposed operation mode
- To provide monitoring and auditing procedures
- To identify provisions for inert waste
- To ensure that all potential subsoil disposal sites and disposal plans are subject to an environmental review and an environmental risk assessment prior to their adoption

- To provide procedures for offsite disposal or long term storage of contaminated material

14.3.11.3 Accountability

Ultimate responsibility for correct waste disposal lies firmly with SCP Partners. and in this role it will ensure that:

- Project contractor (s) have adequate training and follow stipulated waste management procedures for minimising, handling and storing waste
- Waste disposal contractor(s) use facilities for treatment and disposal of waste that meet acceptable standards
- Audits are carried out to ensure these are achieved

14.3.11.4 Monitoring & review

The waste management plans will be monitored prior to the start of construction and monthly thereafter. During operational activities, the waste management plan review will be an integrated part of the EMS and will regularly audited throughout the year.

14.3.11.5 Resources

Detailed waste management procedures will be put in place including the requirement for consignment notes giving an accurate description of the waste. Consignment notes follow wastes to the ultimate disposal site/operator and provide an auditable trail. All personnel employed at the project facilities will receive formal waste management awareness training, particularly regarding the correct waste segregation, storage and labelling procedures and potential recycling of waste.

14.3.12 Emergency response plan

14.3.12.1 Introduction

An Emergency Response Plans must be drawn up and implemented by the Contractor during the construction of SCP in order to minimise the negative impacts due to potential unplanned incidents during construction.

An operational Emergency Response Plan will then be drawn up and implemented during the operational phase of SCP.

These plans will seek to minimize the risk of all accidents and incidents during construction and subsequent operation of the SCP. The plans will address contingency planning, training, and specific procedures to address accidents and incidents.

14.3.12.2 Objectives

Construction Phase

The following are the objectives of the Construction Emergency Response Plan:

- Provide guidelines for responding to an incident involving a significant spillage of fuel/hydrocarbons

- Outline basic principles involved in a spill site assessment
- Provide guidance for selecting appropriate response procedures depending on the characteristics of the area in which the spill has occurred

In order to address these objectives the Construction Emergency Response Plan will include as a minimum the following:

- Site assessments in terms of their environmental sensitivities
- Identification of potential accidents and incidents
- Identify types of environmental incidents and near misses
- Include a Contingency plan identifying material, personnel and contact numbers
- Procedures to be followed during an incident response
- Emergency response training for all construction crews
- Releases to the atmosphere, eg, techniques for isolating the source
- Spillage on land: small spillage (less than 50 L), eg,
 - Techniques for isolating the source
 - Use of absorbent material to mop up spill
 - Appropriate disposal of contaminated soil
 - Incident reporting
- Spillage on land: larger spillage (more than 50 L), eg,
 - Techniques for isolating the source
 - Containment of the spread of the spill using sand bags
 - Excavation of trenches down hill of spill to intercept groundwater with absorbent material in trench
 - Appropriate disposal of contaminated material
 - Incident reporting
- Spillage into water, eg,
 - Techniques for isolating the source
 - Deployment of a boom downstream of the spillage and spanning the entire watercourse
 - Angling of the boom to direct pollutant to one of the banks
 - Use of floating absorbent and/or skimmers to remove the pollutant
 - Removal of contaminated material from site in accordance with statutory regulations
- Procedures to dispose of contaminated material
- Procedures for investigating actions undertaken

The construction Emergency Response Plan will include procedures for incident reporting. In all cases an incident report shall be issued within 48 hours of the incident. For significant cases (eg, in excess of 50 L of hydrocarbon) the incident shall be reported immediately. The Contractor will comply with the reporting requirements of the local or national authorities.

Operational Phase

The objectives of the Operational Emergency Response Plan are to define:

- Emergencies and their reporting
- Organisational structure and ensure effective interfacing with stakeholders
- Procedures
- Resources
- Training

In order to address these objectives the Operational Emergency Response Plan will include as a minimum the following:

- Definition of an emergency
- Identification, initial reporting and classification of emergencies
- The Emergency Response organisation and management structure
- Interfaces with authorities, affected third party organisations and the public
- Emergency Response resources (manpower and equipment, etc)
- Responsibilities of Emergency Response personnel
- Specific procedures to be followed, including evacuation
- Training requirements for assigned emergency personnel
- Procedures for testing, reviewing and updating the plans and procedures

14.3.12.3 Accountability

Prior to commencing any site work, the Contractor will develop construction Emergency Response Plan. The Contractor is responsible for the implementation and audit of the effectiveness of these. The Contractor's performance will be monitored by the SCP Project Manager or his delegate.

During operation the SCP Partners will be responsible for the Operational Emergency Response Plan.

14.3.12.4 Reporting

Monthly reports will present the monitoring of compliance with the Emergency Response Plan. These reports will be prepared by the Contractor for submission to the SCP Project Manager or his delegate. The SCP Project Manager or his delegate will audit the activities of the Contractor's Community Liaison Team at least every six months.

14.3.12.5 Resources

The Contractor will be responsible for the Construction Emergency Response Plan. Additional resources may be required in complex situations and the Contractor will provide these.

The SCP Project Manager or his delegate will be responsible for the Operational Emergency Procedures Plan.

14.4 CONSTRUCTION AND OPERATION PHASE MONITORING

14.4.1 Construction phase monitoring

This section presents the different monitoring activities that will be undertaken throughout the construction activities. Monitoring is an important element of the overall EMS, encouraging implementation of the agreed measures and providing information on their effectiveness. Where mitigation measures are not effective, they will be reviewed and alternative strategies put in place.

14.4.1.1 Key performance indicators

Key Performance indicators will be set for both environmental and social management of key issues. These will be discussed and set with contractors during bid negotiations and will be integral to SCP Partner's monitoring of the contractor's environmental and social management performance. Positive financial incentives may be attached to the achievement of these.

14.4.1.2 Actions and Responsibilities

SCP Partners monitoring and assurance activities will be mainly associated with oversight and audit of the construction contractors and the construction process following the review and approval of the contractor's method statements. In this role SCP Partners will be assisted as required by experienced consultants, independent third parties, and inspection companies.

SCP Partners activities will consist of the following:

- Spot-check verification of contractors' own monitoring procedures
- Audits and compliance reviews of environmental and social elements of the contract (including the ESIA).

14.4.2 Construction phase monitoring

Table 14.3 presents environmental monitoring activities for generic impacts & their associated specific mitigation measures on the ROW, as set out in Section 10.

Monitoring of social impacts mitigation (both on the ROW and in local communities) as set out in Section 11, are outlined in Table 14-4.

Where monitoring highlights that mitigation measures are ineffective or have not been fully complied with SCP Partners will immediately discuss with the contractor the following:

- Steps required to ensure compliance with overall objectives
- Feasibility of mitigation measure, including cost effectiveness, so that more appropriate measures can be agreed if necessary
- Whether the impact has already been fully mitigated

Table 14-5 Environmental Monitoring Activities

Aspect	Mitigation Procedure	Monitoring Action	Responsibility	Timing
A1 Use of raw materials & natural resources	Development and implementation of procurement, supply and waste management procedures	Review and approval of the contractors Procurement and Supply Management Plan and Waste Management Plan	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of procurement and waste management processes	Contractors	Throughout construction period
		Spot checks on procurement and waste management processes	SCP Partners	Throughout construction period
A2 Loss of habitat	Development and implementation of: <ul style="list-style-type: none"> • Environmental management plans • Construction method statements (including clearance) • Transport Management (including route selection) • Reinstatement Plan Additional ecological surveys and translocation programmes	Review and approval of the contractors management plans, detailed construction method statements and reinstatement plan	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period
		Spot checks on completion of all necessary pre-construction assessments and development of mitigation actions for sensitive sites	SCP Partners.	Pre-construction
		Routine monitoring of species translocation programmes	SCP Partners	Pre-construction and during construction in sensitive areas

Table 14-5 Environmental Monitoring Activities

Aspect	Mitigation Procedure	Monitoring Action	Responsibility	Timing
A3 Rail Movements	Mitigation measures to be formulated in conjunction with local rail operators	Review and approval of the contractors Transport management plan, Infrastructure and Services Management Plan, Community Liaison Management Plan, Community Safety Management Plan and Procurement and Supply Management Plan	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period
		Spot checks on completion of all necessary pre-construction assessments and development of mitigation actions for sensitive sites	SCP Partners.	Pre-construction
A4 Metal vapour emissions	Ensure adequate ventilation and dispersion of vapours Ensure welding is undertaken by appropriately trained personnel	Review and approval of the contractors Employment and Training Management Plan and detailed construction method statements	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period

Table 14-5 Environmental Monitoring Activities

Aspect	Mitigation Procedure	Monitoring Action	Responsibility	Timing
A5 Introduction of competitive species or diseases	<ul style="list-style-type: none"> • Inclusion of environmental issues in workforce and visitor induction training • Confine activities to demarcated working and access route areas • Avoidance of the introduction of invasive species 	Review and approval of the contractors training plan, transport management plan, detailed construction method statements and reinstatement plan	SCP Partners.	Pre-construction
		Review and approval of species selected for re-vegetation programmes		
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
A6 Visibility (of facilities)	<ul style="list-style-type: none"> • Reinstatement of lands as close as practical to pre-existing conditions • Selection of facilities finishes and colour schemes that are sympathetic to the local landscape 	Spot checks on the contractors performance	SCP Partners	Throughout construction period
		Review and approval of the contractors detailed construction method statements and reinstatement plan	SCP Partners.	Pre-construction
		Review and approval of colour schemes adopted for facilities		
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period
		Spot checks on ongoing maintenance of mitigation measures	SCP Partners.	Throughout operational period

Table 14-5 Environmental Monitoring Activities

Aspect	Mitigation Procedure	Monitoring Action	Responsibility	Timing
<i>A7 Potential for accidental spillage of hazardous materials (eg lubrication fluids, oils, paints, diesel etc).</i>	Development and implementation of specific procedures for hazardous materials management	Review and approval of the contractors Pollution Prevention Management Plan, Employment and Training Management Plan, Transport Management Plan, Procurement and Supply Management Plan, Waste Management Plan, Emergency Response plan, and construction method statements	SCP Partners.	Pre-construction
	Minimisation of acquisition and storage of hazardous materials	Recording and regular review of incidents and near misses	Contractors	Throughout construction period
	Training of personnel in safe use & handling of hazardous materials	Routine monitoring, documentation and review of training, procurement, storage and waste management processes	Contractors	Throughout construction period
	Provision of appropriate spill response equipment and spill response training	Spot checks on contractor performance and record keeping	SCP Partners	Throughout construction period
	Rapid response in event of spillage	Routine review of incident and near miss data.		

Table 14-5 Environmental Monitoring Activities

Aspect	Mitigation Procedure	Monitoring Action	Responsibility	Timing
<i>A8 Production & disposal of solid & liquid waste</i>	Provision of waste treatment facilities, control of liquid waste generation and disposal in accordance with project standards. Training of project workers and visitors to project sites.	Review and approval of the contractors Procurement and Supply Management Plan, Pollution Prevention Management Plan, Construction Camp Management Plan and Waste Management Plan	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of procurement, materials management and waste management processes	Contractors	Throughout construction period
		Routine monitoring of effluent discharges and atmospheric emissions from incineration plant	Contractors	Throughout construction period
		Spot checks on procurement and waste management processes Routine review of discharge monitoring data	SCP Partners	Throughout construction period
<i>A9 Production of black and greywater</i>	Provision of waste water and sewage treatment facilities, control of liquid waste generation and disposal in accordance with project standards. Training of project workers and visitors to project sites.	Review and approval of the contractors Pollution Prevention Management Plan, Construction Camp Management Plan and Waste Management Plan	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of pollution prevention, training and waste management processes	Contractors	Throughout construction period
		Routine monitoring of effluent discharges and atmospheric emissions from incineration plant	Contractors	Throughout construction period
		Spot checks on pollution prevention, training and waste management processes Routine review of discharge monitoring data	SCP Partners	Throughout construction period

Table 14-5 Environmental Monitoring Activities

Aspect	Mitigation Procedure	Monitoring Action	Responsibility	Timing
A8/A9 Disposal of liquid wastes/water (Hydrotest Specific Measures)	Risk assessment to be undertaken before any chemical additives are used in hydrotest water	Review and approval of the contractors Pollution Prevention Management Plan, Procurement and Supply Management Plan, Waste Management Plan, Infrastructure and Services Management Plan and detailed construction method statements	SCP Partners.	Pre-construction
	Controlled discharge of water to reduce soil erosion	Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
	Testing and treatment of water before discharge	Spot checks on the contractors performance	SCP Partners	Throughout construction period
	Responsible disposal of waste water; no disposal of incompatible water in areas of groundwater or surface water vulnerability			

Table 14-5 Environmental Monitoring Activities

Aspect	Mitigation Procedure	Monitoring Action	Responsibility	Timing
A10 Disturbance of land surface & vegetation	Vehicle movements confined to defined access routes Provision of environmental training to drivers and plant operators Community liaison to discourage local use of ROW as road Common access routes to be used for BTC pipeline, SCP and WREP were practical Traffic movements to be preceded by an assessment of ground conditions	Review and approval of the contractors Transport Management Plan, Infrastructure and Services Management Plan, Community Liaison Management Plan and Community Safety Management Plan	Contractor	Throughout Construction Period
		Routine monitoring, documentation and review of traffic management and community liaison processes	Contractors	Throughout construction period
		Spot checks on traffic management, training and community liaison processes. Routine review of access route condition and adherence to defined access routes.	SCP Partners	Throughout construction period
A11 Vehicle movements	<ul style="list-style-type: none"> • Selection of appropriate routes for vehicles using public road network and project access roads • Provision of environmental training for vehicle drivers and equipment operators • Control of operational speeds and operating times • Maintenance of vehicles and plant 	Review and approval of the contractors Transport Management Plan, Infrastructure and Services Management Plan and Employment and Training Management Plan	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of traffic management and training processes	Contractors	Throughout construction period
		Collection and review of incident and near miss data	Contractors	Throughout construction period
		Spot checks on procurement and waste management processes Routine review of incident and near miss reports	SCP Partners	Throughout construction period

Table 14-5 Environmental Monitoring Activities

Aspect	Mitigation Procedure	Monitoring Action	Responsibility	Timing
A12 Soil compaction	<ul style="list-style-type: none"> • Protection of soil storage areas from vehicle movements • Protection of soil surface in areas of soft ground • Provision of appropriate drainage and regular regrading 	Review and approval of the contractors management plans, detailed construction method statements and Reinstatement Plan	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period
		Spot checks on completion of all necessary pre-construction assessments and development of mitigation actions for sensitive sites	SCP Partners.	Pre-construction
A13 Dust generation	<ul style="list-style-type: none"> • Access limited to demarcated ROW and specified access roads. • Strict enforcement of project speed limits • Reinstatement as early as practical • Damping down of ROW • Identification of areas of particularly sensitive receptors (eg, villages or crops) 	Review and approval of the contractors Transport management plan, Pollution Prevention Management Plan, detailed construction method statements and Reinstatement Plan	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period
		Spot checks on completion of all necessary pre-construction assessments and development of mitigation actions for sensitive sites	SCP Partners.	Pre-construction

Table 14-5 Environmental Monitoring Activities

Aspect	Mitigation Procedure	Monitoring Action	Responsibility	Timing
A14 Combustion gases (CO₂, CO, NO₂, NO, SO₂, PM, CH₄, VOCs)	<ul style="list-style-type: none"> Maintenance of all vehicles and plant to meet relevant international standards and manufacturer's recommendations Monitoring of vehicle and plant emissions Optimisation of plant running time (where appropriate) 	Review and approval of the contractors Transport management plan, Pollution Prevention Management Plan, Construction Camp Management Plan and detailed construction method statements	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Routine monitoring of atmospheric emissions from major fixed plant (eg, incinerators)	Contractors	Throughout construction period
		Spot checks on the contractors performance Routine review of discharge monitoring data	SCP Partners	Throughout construction period
A7 Fuel & oil leaks	<ul style="list-style-type: none"> Ensure a high standard of vehicle maintenance Use only designated fuel storage methods and refuelling procedures 	Review and approval of the contractors Pollution Prevention Management Plan, Employment and Training Management Plan, Transport Management Plan, Emergency Response plan, and construction method statements	SCP Partners.	Pre-construction
		Recording and regular review of incidents and near misses	Contractors	Throughout construction period
		Routine monitoring, documentation and review of training, procurement, storage and waste management processes	Contractors	Throughout construction period
		Spot checks on contractor performance and record keeping Routine review of incident and near miss data.	SCP Partners	Throughout construction period

Table 14-5 Environmental Monitoring Activities

Aspect	Mitigation Procedure	Monitoring Action	Responsibility	Timing
A16 Noise emissions	<ul style="list-style-type: none"> • Control of vehicle and plant noise generation • Control of operating hours • Appropriate selection and maintenance of plant, vehicles and access routes • Appropriate selection of construction techniques • Community liaison • Ensure environmental considerations are incorporated into the siting and design of camps • Implement workforce education with respect to minimising disruptive activities. Incorporate into the project induction training • Implementation of camp rules including restrictions on noisy activities 	Review and approval of the contractors Transport management plan, Construction Camp Management Plan, Pollution Prevention Management Plan, Infrastructure and Services Management Plan, Community Liaison Management Plan, Procurement and Supply Management Plan and detailed construction method statements.	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period
		Spot checks on completion of all necessary pre-construction assessments and development of mitigation actions for sensitive sites	SCP Partners.	Pre-construction
A16 Noise emissions (During Operations)	<ul style="list-style-type: none"> • Monitoring of emissions • Maintenance of plant to ensure compliance with project noise limits 	Review and approval of environmental management and monitoring procedures for operations	SCP Partners. management team/third parties	Prior to Operational Period
		Routine monitoring and review of emissions from combustion plant during operations	SCP Partners.	Throughout Operational Period
		Spot checks on SCP Partners performance	SCP Partners. management team/third parties	Throughout Operational period

Table 14-5 Environmental Monitoring Activities

Aspect	Mitigation Procedure	Monitoring Action	Responsibility	Timing
A17 Abstraction of Ground Water	<ul style="list-style-type: none"> • Sampling and analysis of water from existing boreholes • Adherence to national and local licensing policy for abstractions • Test-pumping of new abstractions and monitoring of impacts on existing abstractions • Monitoring of water levels in wetlands 	Review and approval of the contractors Pollution Prevention Management Plan, Infrastructure and Services Management Plan, Community Liaison Management Plan and detailed construction method statements	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period
		Spot checks on completion of all necessary pre-construction assessments and development of mitigation actions for sensitive sites	SCP Partners.	Pre-construction
A18 Disruption of drainage / irrigation channels	<ul style="list-style-type: none"> • Undertake pre-construction surveys of irrigation and drainage systems as necessary to identify existing systems and devise temporary replacement measures if required, • Undertake liaison with land owners/land occupiers/land users • Include provisions for drainage/irrigation management 	Review and approval of the contractors Infrastructure and Services Management Plan, Community Liaison Management Plan, Reinstatement Plan and detailed construction method statements	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period
		Spot checks on completion of all necessary pre-construction assessments and development of mitigation actions for sensitive sites	SCP Partners.	Pre-construction

Table 14-5 Environmental Monitoring Activities

Aspect	Mitigation Procedure	Monitoring Action	Responsibility	Timing
A19 Soil erosion	<ul style="list-style-type: none"> • Implementation of erosion control measures • Compaction of soil stack surface to minimise erosion • Preparation & implementation of approved crossing methods 	Review and approval of the contractors Pollution Prevention Management Plan, Reinstatement Plan and detailed construction method statements (with specific attention to those concerning river crossings)	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period
		Spot checks on completion of all necessary pre-construction assessments and development of mitigation actions for sensitive sites	SCP Partners.	Pre-construction

Table 14-5 Environmental Monitoring Activities

Aspect	Mitigation Procedure	Monitoring Action	Responsibility	Timing
<i>A20 Disturbance of archaeological remains</i>	<ul style="list-style-type: none"> • Ensure appropriate management of cultural heritage • Undertake pre-construction works to evaluate & record known/suspected sites • Implement a programme of archaeological surveillance during the clearance of the ROW and ancillary sites • Ensure that issues of archaeological awareness are included in induction training. 	Review and approval of the contractors Cultural Heritage Management Plan, Employment and Training Plan and detailed construction method statements	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period
		Spot checks on completion of all necessary pre-construction assessments and development of mitigation actions for sensitive sites	SCP Partners.	Pre-construction
<i>A21 Loss of soil structure and fertility</i>	Ensure appropriate segregation, storage, management and reinstatement of stripped soil	Review and approval of the contractors management plans, detailed construction method statements and Reinstatement Plan	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period

Table 14-5 Environmental Monitoring Activities

Aspect	Mitigation Procedure	Monitoring Action	Responsibility	Timing
A22 Loss of viability of soil seed bank	<ul style="list-style-type: none"> • Undertake an environmental review of the route to identify areas where pre-construction seed collection, harvesting of seeds from surrounding areas and/or the establishment of nursery crops should be carried out • Ensure appropriate segregation, storage, management and reinstatement of topsoil 	Review and approval of the contractors management plans, detailed construction method statements and Reinstatement Plan	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period
		Spot checks on completion of all necessary pre-construction assessments and development of mitigation actions for sensitive sites	SCP Partners.	Pre-construction
A23 Impeded movement of wild animals, and domestic herds	<ul style="list-style-type: none"> • Ensure that gaps are left in soil stacks at strategic locations • Leave gaps in welded strings at critical locations to allow passage of domestic herds • Minimise interval between welding and ditching 	Review and approval of the contractors Community Liaison Management Plan, Infrastructure and Services Management Plan, detailed construction method statements and Reinstatement Plan	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period

Table 14-5 Environmental Monitoring Activities

Aspect	Mitigation Procedure	Monitoring Action	Responsibility	Timing
<i>A24 Increased flood risk</i>	<ul style="list-style-type: none"> • Ensure that gaps are left in topsoil stacks to allow floodwater through • Ensure the continued viability of pre-existing drainage and irrigation systems throughout the project 	Review and approval of the contractors Infrastructure and Services Management Plan, Community Liaison Management Plan, Reinstatement Plan and detailed construction method statements	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period
		Spot checks on completion of all necessary pre-construction assessments and development of mitigation actions for sensitive sites	SCP Partners.	Pre-construction
<i>A25 Modified topography</i>	Ensure that reinstatement is sympathetic to existing contours	Review and approval of the contractors Reinstatement Plan and detailed construction method statements	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period

Table 14-5 Environmental Monitoring Activities

Aspect	Mitigation Procedure	Monitoring Action	Responsibility	Timing
<i>A26 Disposal of surplus subsoil</i>	<ul style="list-style-type: none"> • Ensure that the generation of surplus soil is minimised and that disposal is conducted appropriately • Ensure that any potential subsoil disposal sites and disposal plans are subject to an environmental review prior to their adoption 	Review and approval of the contractors Waste Management Plan, Reinstatement Plan and detailed construction method statements	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period
		Spot checks on completion of all necessary additional assessments and development of appropriate mitigation actions	SCP Partners.	Pre-construction
<i>A27 Altered drainage</i>	<ul style="list-style-type: none"> • Ensure appropriate consolidation of backfill • Implementation of erosion control measures 	Review and approval of the contractors Reinstatement Plan, Infrastructure and Services Management Plan and detailed construction method statements	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period

Table 14-5 Environmental Monitoring Activities

Aspect	Mitigation Procedure	Monitoring Action	Responsibility	Timing
<i>A28 Disturbance of known/unknown contaminated land</i>	<ul style="list-style-type: none"> • Avoid construction in areas of known or suspected contamination as far as is practical • Ensure that where contaminated land is encountered it is effectively managed 	Review and approval of the contractors Pollution Prevention Management Plan, Waste Management Plan, Reinstatement Plan and detailed construction method statements	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period
		Spot checks on completion of all necessary additional assessments and development of appropriate mitigation actions	SCP Partners.	Pre-construction
<i>A29 Disposal of trench-water</i>	Ensure that trench-water disposal is undertaken in an appropriate manner	Review and approval of the contractors Pollution Prevention Management Plan, Waste Management Plan, Reinstatement Plan and detailed construction method statements	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period

Table 14-5 Environmental Monitoring Activities

Aspect	Mitigation Procedure	Monitoring Action	Responsibility	Timing
A30 Public & animal safety	<ul style="list-style-type: none"> • Erection of warning barriers where significant risk to public and livestock exists • Installation of soft plugs in ditch with sloped edges to allow animal egress 	Review and approval of the contractors Community Safety Management Plan, Infrastructure and Services Management Plan, Reinstatement Plan and detailed construction method statements	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period
A42 Discharge of ground water	<ul style="list-style-type: none"> • Ensure that groundwater disposal is undertaken in accordance with the Construction Environmental Management Plan • Filter discharge if contains visible suspended solids • Use of appropriate measures to minimise scour at the discharge point 	Review and approval of the contractors Pollution Prevention Management Plan, Waste Management Plan, Reinstatement Plan and detailed construction method statements	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period

Table 14-5 Environmental Monitoring Activities

Aspect	Mitigation Procedure	Monitoring Action	Responsibility	Timing
A34 Partial road closure	<ul style="list-style-type: none"> • Use non-open trench crossing techniques for major roads • Minimise duration of closure of roads and provide temporary access where necessary • Use steel plates across trench to maintain access • Institute temporary traffic control, where necessary • Undertake community consultation 	Review and approval of the contractors Transport Management Plan, Infrastructure and Services Management Plan, Community Safety Management Plan, Community Liaison Management Plan, Reinstatement Plan and detailed construction method statements	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period
A35 Sediment release	<ul style="list-style-type: none"> • Avoid open cut river crossings on spawning rivers (the West Kura and the Hasansu) between early October and late June • Include environmental considerations in the selection of crossing design and choice of methodology 	Review and approval of the contractors Pollution Prevention Management Plan, Emergency Response Plan, Reinstatement Plan and detailed construction method statements	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period

Table 14-5 Environmental Monitoring Activities

Aspect	Mitigation Procedure	Monitoring Action	Responsibility	Timing
A36 Modified river flow	Provide flow management mechanisms at watercourse crossings	Review and approval of the contractors Infrastructure and Services Management Plan, Community Liaison Management Plan, Reinstatement Plan and detailed construction method statements	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period
		Spot checks on completion of all necessary pre-construction assessments and development of mitigation actions for sensitive sites	SCP Partners.	Pre-construction
A37 Impeded fish migration	<ul style="list-style-type: none"> • If river is dammed, undertake an environmental review to identify key sensitivities for the fish population. • Include environmental considerations in the scheduling of the crossing. • Include provisions for fish capture and release on far side of dam or for channel diversions. • Minimise the duration of any flow interruptions 	Review and approval of the contractors Reinstatement Plan and detailed construction method statements	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period
		Spot checks on completion of all necessary pre-construction assessments and development of mitigation actions for sensitive sites	SCP Partners.	Pre-construction

Table 14-5 Environmental Monitoring Activities

Aspect	Mitigation Procedure	Monitoring Action	Responsibility	Timing
A41 Potential for drilling fluid breakout/spillage (During HDD)	<ul style="list-style-type: none"> • Adequate geotechnical survey work conducted during design • Risk assessment to be undertaken before drilling in vicinity of sensitive surface waters • Storage of drilling muds in bunded area • Avoid use of toxic chemicals in drilling fluid 	Review and approval of the contractors Pollution Prevention Management Plan, Emergency Response Plan, Waste Management Plan and detailed construction method statements	SCP Partners.	Pre-construction
		Routine monitoring, documentation and review of application of mitigation measures	Contractors	Throughout construction period
		Spot checks on the contractors performance	SCP Partners	Throughout construction period
		Spot checks on completion of all necessary pre-construction assessments and development of mitigation actions for sensitive sites	SCP Partners.	Pre-construction
A44 Loss of boundaries	<ul style="list-style-type: none"> • Reinstatement of boundaries following construction • Ensure consultation with landowners, occupiers and users 	Review and approval of the contractors Infrastructure and Services Management Plan, Community Liaison Management Plan and Reinstatement Plan	Contractor	Throughout Construction Period
		Routine monitoring, documentation and review of traffic management and community liaison processes	Contractors	Throughout construction period
		Spot checks on community liaison processes.	SCP Partners	Throughout construction period
		Routine review of access route condition and adherence to defined access routes.		

Table 14-7 Social monitoring plan during construction

Mitigation Measure	Monitoring Action	Responsibility for Monitoring	Frequency/Timing
DURING CONSTRUCTION			
Community Relations			
Community Grievance Process	Spot follow up of complaints recorded in complaints register to assess whether process has been carried out correctly.	SCP Community Relations Team	Monthly
General Community Relations Management	<p>Random attendance at community meetings:</p> <ol style="list-style-type: none"> 1. Preliminary meetings – to assess whether appropriate information is being provided to communities and whether sufficient information collected from communities in order to ensure mitigation will be carried out effectively (eg road documentation process, identification of bee owners, etc) 2. Meetings during construction in vicinity of village to assess whether complaints and issues are being dealt with effectively and to gauge the feelings of community members towards the project <p>Spot monitoring on whether liaison with informal communities (eg. herders, internally displaced people) who are affected by the construction process have been consulted with. (Check for written reports of meetings, talk with these communities informally to ask whether they have been consulted)</p>	SCP Community Relations Team	<p>Meeting each month for communities along pipeline route.</p> <p>Bi-monthly for community meetings at construction camp affected locations.</p> <p>Bi-monthly for informal communities along route.</p>
Worker induction training (by CLOs)	<p>Review induction training materials</p> <p>Review induction training course</p>	SCP Community Relations Team	<p>Before implementation of training.</p> <p>Once during main recruitment period along route, once more during any secondary recruitment drives further along route.</p>

Table 14-7 Social monitoring plan during construction

Mitigation Measure	Monitoring Action	Responsibility for Monitoring	Frequency/Timing
Construction Camp Disciplinary Procedures	Review HR Records, disciplinary log books etc at construction camps to ensure that construction camp rules are being implemented effectively, the extent to which there are infringements of the rules, and the effectiveness of community liaison following any incident.	SCP Community Relations Team	Once two months after a camp is in operation. If major issues are found, then review one month later, until issues are being managed satisfactorily. If issues found in first review are minor, monitor each 3-4 months during operational lifetime.
General Review of Community Relations Mitigation Measures	Monitor any changes to community relations mitigation measures via: formal review meetings with CLO team Acceptance of formal requests for changes to measures where appropriate Spot checks to identify where mitigation has changed but has not been notified to SCP Partners via general review of mitigation activities	SCP Community Relations Team	Every month for first three months and then on a six monthly basis or as needed Monthly at construction camps and at construction sites on ROW
Construction Impacts			
Implementation of general construction mitigation measures	Spot checks at ROW, construction sites and affected communities to ensure mitigation measures are being implemented. This will look specifically at: <ul style="list-style-type: none"> • Implementation of measures to avoid disruption to infrastructural services such as telecoms, electricity, gas and water. • Implementation of community safety measures (fencing near residential areas, fencing on public trench crossings, warning lights and warning signs at open areas of trench) • Suitable diversions are in place where necessary • Dust and noise mitigation measures are in place • Alternative water sources are provided as appropriate 	SCP – Engineering Project Manager and SCP Community Relations Team	Monthly for first 3 months. If implementation of mitigation measures is proceeding appropriately, reduce monitoring to bi-monthly with review of written activity reports submitted on a weekly basis.

Table 14-7 Social monitoring plan during construction

Mitigation Measure	Monitoring Action	Responsibility for Monitoring	Frequency/Timing
	<ul style="list-style-type: none"> • Activity is taking place only within approved construction areas and these approved areas are clearly de-marcated • Sediment prevention measures are in place as appropriate • Quality of repair work done on any damaged property (eg houses, fencing, irrigation channels, etc) is acceptable to SCP Partners and has been agreed as acceptable with property owner. With housing compare repaired state with documentation from pre-construction assessment • Equipment secured appropriately over night and night security and storage measures are being implemented (eg organic waste removed, night watchmen employed, lighting over open trench) 		
Traffic Management Plan	See Environmental monitoring measures		
Additional project sites	Verify that appropriate social impact assessment and consultation has been completed for any additional sites to be used by project (eg. waste sites, aggregate sites, additional camps or pipe yards.) Review documentation of community consultation data as appropriate.	SCP Community Relations Team and Environmental Management Team	As needed.
Community consultation on roads	Spot monitoring of community consultation and documentation re construction of new roads and quality of existing roads	SCP Community Relations Team	In two to three locations during in first two to three months of construction process. If implementation of measures is considered insufficient, continue to monitor two to three communities on a bi-monthly basis. If implementation is satisfactory, spot monitor two to three communities on a six monthly basis.

Table 14-7 Social monitoring plan during construction

Mitigation Measure	Monitoring Action	Responsibility for Monitoring	Frequency/Timing
Condition of roads	Routine monitoring standard of roads being used during construction process (as identified in the TMP) against initial documentation	SCP – Engineering Project Manager	Monthly for first three months. If implementation of mitigation measures outlined in Section 11 is proceeding appropriately, reduce monitoring to bi-monthly with review of written activity reports submitted on a weekly basis.
Use of Power and Water resources by project	Review monthly power and water reports to assess whether they are within guidelines set out in ESIA and spot monitor at construction camps during construction/AGIs (during operation) to verify data being reported.	SCP Community Relations Team in conjunction with Engineering Project Manager	Monthly review of reports six monthly spot reviews. If resource usage is considerably over guidelines, monitor every two months until usage is within acceptable norms.
Local Sourcing	Review of purchasing arrangements against local sourcing plan and targets/KPIs set during bid negotiations	SCP Community Relations Manager	Bi-monthly
Health and Safety			
Community safety	Spot monitoring of health and safety incidence rates for community members and full review of any serious incidents. Spot monitoring of community traffic safety meetings	SCP Health and Safety manager	Monthly Two to three times in first four months and if training is seen as acceptable, revert to once every six months. If training is not of sufficient quality then continue at two to three every four months.
General safety	Spot monitoring of implementation of safety measures during	SCP – Engineering	Monthly for first three

Table 14-7 Social monitoring plan during construction

Mitigation Measure	Monitoring Action	Responsibility for Monitoring	Frequency/Timing
measures during construction	construction as outlined in 'Implementation of general construction mitigation measures', General Construction Impacts section above.	Project Manager	months. If implementation of mitigation measures is proceeding appropriately, reduce monitoring to bi-monthly with review of written activity reports submitted on a weekly basis.
Health and safety training	Monitor HR records to ensure training is provided to all workers and spot monitor all courses (general health and safety, safe driving training, job specific health and safety) provided to ensure training is adequate	SCP Health and Safety Manager	
Employment			
Recruitment targets	Monitor monthly recruitment targets through monthly reports from construction contractor	SCP Community Relations Team	Monthly
Recruitment process	Assess construction contractor's recruitment strategy for effectiveness at ensuring reasonable geographic spread before recruitment begins Validation of appropriate identification system Review job descriptions to be provided at recruitment centres to ensure accurate and adequate information is provided.	Independent third party, eg. NGO SCP Community Relations Team	Pre-construction Pre-construction and as new job descriptions are developed.
Inequities in recruitment process	Independent person to oversee all recruitment in addition to SCP person Sample monitoring of recruitment days	SCP Community Relations Team Independent third party, eg. NGO	All major recruitment days Presence at two to three of monitoring days in initial recruitment round
Working Conditions	Sample audits of Constructor's HR documentation recording working conditions for all workers. This should include inspection of records of hours worked, wages paid, disciplinary actions taken, etc.	SCP Human Resources and Community Relations Teams	Once in first three months. If conditions meet local legal requirements and international standards, spot review every six months. If

Table 14-7 Social monitoring plan during construction

Mitigation Measure	Monitoring Action	Responsibility for Monitoring	Frequency/Timing
			standards have not been met, spot review every one-two months until standards are reached.

14.4.3 Operational phase monitoring

The following table (Table 14-5) presents the operational monitoring plan and uses the same approach as employed for construction activities.

Table 14-9 Operational Phase Monitoring

Receptor	Location of Impact	Potential Impact	Mitigation	Responsibility for Implementation
Water Resources	ROW	Release of sediments as a result of scour around pipe	Undertake periodic monitoring of river crossings and gorge crossings for signs of instability. This will be undertaken as part of pipeline surveillance.	Operator
	AGIs	Discharge of sanitary waste water to water courses	Discharges of treated effluent from permanently manned facilities will be monitored regularly.	Operator
	AGIs	Spill of fuel or liquid waste and contamination of groundwater	Integrity of secondary containment for all petroleum containing tanks at valves to be monitored monthly.	Operator
Ecology	ROW	Soil erosion and habitat deterioration	Ongoing inspection and maintenance of drainage control and erosion control features. This would be undertaken during operation as part of pipeline inspection No vehicular access on reinstated ROW other than in case of emergency. This will be achieved by gates / restricted access and appropriate signs. Illegal access to the ROW will be discouraged by means of placing obstructions, such as fencing, large stones, logs, etc. along key locations of reinstated ROW. Maintenance of reinstated areas and areas damaged by third party vehicular access or by emergency access. Damaged areas will be identified through pipeline surveillance undertaken by horse or foot on a weekly basis.	Operator
	AGIs	Noise disturbance	Noise suppression technologies for valves generators will be adopted. Techniques will include buffer zones such as re-forested areas or screening rows. In addition, periodic noise monitoring will be undertaken to determine the effectiveness of such measures	Operator Specialist Ecological/Noise Contractor

Table 14-9 Operational Phase Monitoring				
Receptor	Location of Impact	Potential Impact	Mitigation	Responsibility for Implementation
Contamination of land	AGIs	Spills and leaks	Refer to Emergency Response Plan	Operator
Soil	AGIs	Spills and leaks	Integrity of secondary containment for all petroleum containing tanks at valves to be monitored monthly.	Operator
Heritage and Archaeology	ROW	Contamination as a result of spills	Implement Emergency Response Plan	Operator
Community Relations – General	ROW and facilities	Resentment towards pipeline	Random presence at community meetings	Operator 6 monthly
Community Relations – Infrastructure	ROW and Facilities	Hostility towards pipeline	Publication of power draw figures	Operator, Monthly
Local employment	ROW and Facilities	Local employment is maximised	Monitor local employment figures and report on website	Operator, 6 monthly

14.4.4 Institutional monitoring

It is likely that the SCP Project will seek international finance. This ESIA will be submitted to the IFC for their review and approval.

It is likely that the IFC will also take a role in checking the implementation of commitments made in the ESIA. This may include audit and reviews during both construction and operations phases.

14.4.5 Monitoring of the EMS

The environmental management of the project will be continually subjected to assurance review through a series of internal and external audits. The EMS for both construction and operation phases must meet ISO 14001 requirements. Hence, audits of the EMS will be conducted against the requirements of this standard, as well as the requirements contained within this section as relevant. These will be recorded and reported and corrective actions issued for any non-compliance.

As noted in the section above, the Construction Contractor is responsible for development and implementation of an EMS, including the requirements and framework plans specified in this ESIA. SCP Partners will review and approve the final plans. SCP Partners's principal role will be one of assurance that the Construction Contractor is effectively implementing mitigation measures and management plans.

OVERALL PROJECT ASSESSMENT

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15 OVERALL PROJECT ASSESSMENT

15.1 INTRODUCTION

The ESIA process has identified those SCP project activities that would result in impacts to existing environmental and social conditions, and has provided an evaluation as to the extent of those impacts. Mitigation plans have been developed for each of the impacts to accentuate any positive benefits and to minimise or remove any negative impacts. The most valuable tool in this process has been the analysis of the extensive environmental and social surveys and consultations undertaken over the last two years.

The SCP is being constructed to overcome the limited capacity of existing export options for gas from the Shah Deniz field in the Caspian. At full capacity, and after additional stages of development, it is envisaged that the pipeline will export up to 16bcm/year from the existing Sangachal Terminal near Baku in Azerbaijan, through Georgia to the Georgian-Turkish border. The SCP will link up with a pipeline being constructed within Turkey to transport the gas to Erzurum, where it will enter the domestic supply grid. Not all of the gas from the development of the Shah Deniz gas field will be exported to Turkey. Sales and purchase agreements are also in development with the Governments of Azerbaijan and Georgia.

Alternative transportation modes are evaluated in the ESIA and a pipeline has been selected as the lowest risk option. Alternative pipeline routes are also evaluated. In Azerbaijan, the studies focused on confirming the suitability of the existing Western Route Export Pipeline (WREP) corridor as a common alignment for the SCP and BTC pipelines, thus avoiding opening a second or third energy transportation corridor, and minimizing land-take. This route also follows the main infrastructure corridor of road and railways to Tbilisi and avoids all nationally and internationally designated environmentally sensitive areas. The route has also been selected to avoid densely populated areas, thus avoiding social and economic impacts on communities.

The overall route selection and project design philosophy is based on the following principles:

- Avoidance of impact through careful design and route selection are key. Maximum potential to avoid impacts can be achieved in the early project design stages through careful pipeline routing
- Potential impacts have been minimised through route optimization where the pipeline cannot avoid passing through areas of environmental, cultural or social sensitivity
- Direct mitigation measures have been developed and incorporated into the design and construction process
- Environmental and Community Investment Plans will be developed to offset any unavoidable high or medium residual impacts. The principle of 'no net loss' is applied
- Furthermore, where possible, the intent is to deliver a sustainable benefit to communities and the environment as a result of the SCP project
- Extensive consultation with potentially impacted communities, NGOs, scientists and other interested stakeholders has been key to the impact assessment process and development of avoidance, minimization, and mitigation and compensation measures

15.2 ENVIRONMENTAL PROJECT ASSESSMENT

The assessment shows that the majority of the impacts will be associated with the construction phase. Potential construction impacts will be mitigated through the implementation of good construction practice, management plans, and through the application of localized measures to protect specific or sensitive receptors.

The main residual environmental impacts associated with the construction of the SCP in Azerbaijan as illustrated in Figure 15-1 are:

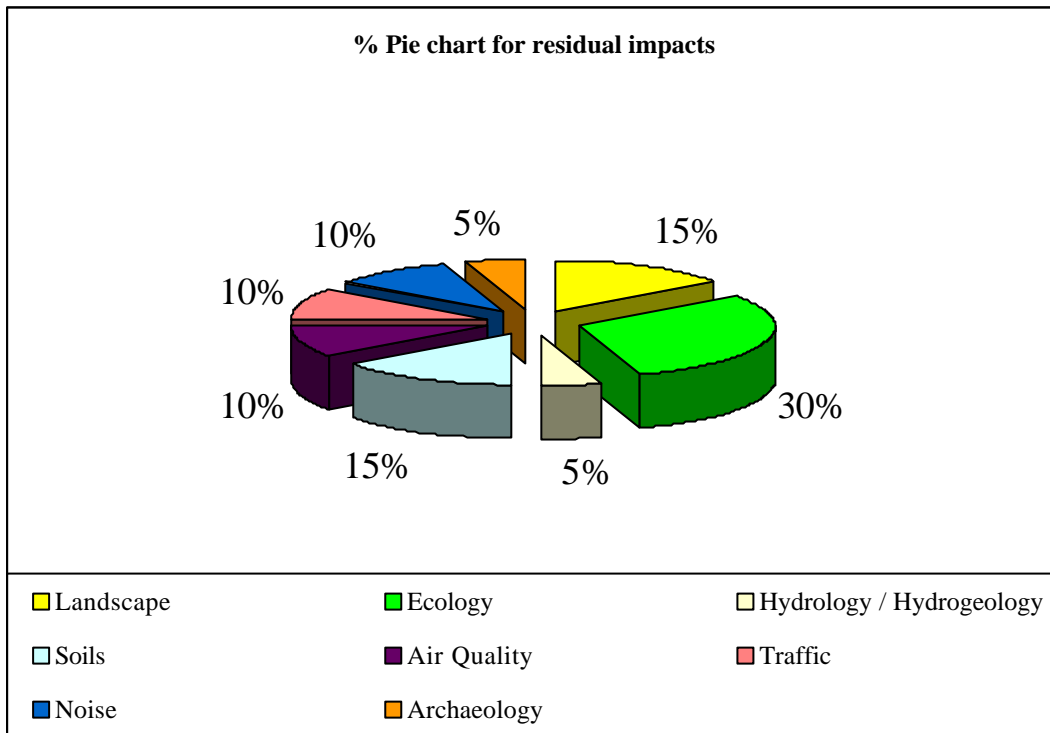
- An estimated 10-12 year period for complete habitat recovery on the construction corridor in the Gobustan desert area following reinstatement
- Localised habitat loss, and visual intrusion in the sensitive Gobustan desert area, resulting from the upgrade of an existing access road
- Soil degradation and increased susceptibility to erosion in localised areas of the Gobustan desert, Mud Volcano Ridge and badlands northwest of Ganja
- Landscape modification where the pipeline is to be constructed along narrow ridges in the Gobustan (Mud Volcano Ridge), Tovuzchay and Hasansu areas
- Short term generation and deposition of dust in the immediate vicinity of the construction works
- Generation of short term, transitory, construction noise
- Short term impacts due to increased traffic movements through towns and villages
- Unavoidable construction through a short section of the Gobustan Archaeological Reserve
- Short term impacts on water quality, flora and fauna during open-cut construction at the Djeyrankechmes, Hasansu and West Kura Rivers

There is also potential for direct construction impacts upon an Internationally Vulnerable species, *Testudo graeca* (spur-thighed tortoise), although mitigation and offset measures have been developed to address this issue which themselves can have a possible residual effect (see Section 13, Cumulative Impacts).

Other positive residual environmental impacts associated with the SCP project include:

- Increased knowledge regarding the Azerbaijan environment through the project baseline studies. These data will be shared with the academic community and made public
- Skills transfer between international and national environmental consultancies and scientists eg in survey techniques and national ecological knowledge
- Archaeological investigations before and during construction which will result in an increased knowledge of archaeological features along the route, increasing the national archaeological record
- Raising public awareness of environmental issues in Azerbaijan, on an international, national, and community level, through publication of documents and consultation

Figure 15-1 Summary of residual impacts



Note: The percentages shown in this pie-chart are for illustrative purposes only; they are based on the professional opinion of the ESIA consultants

The operation of the pipeline will result in no significant adverse impacts.

The potential for unplanned events and the potential consequence of such events on the environment have also been analysed. The pipeline has been designed to ensure that the likelihood of any event occurring and the risk of significant impacts resulting, are very low. In the unlikely event of an incident occurring, the significance of the impact will depend on the scale of the event, geographical location of the event site, and the local metrological, geographical and hydrological conditions.

Impacts caused by interaction with other projects in the area were also assessed. The main cumulative impacts result from SCP construction following on immediately after BTC pipeline construction. This results in an increased duration for many of the construction related impacts and a longer period prior to final reinstatement.

The environmental mitigation measures identified in this ESIA describe how these impacts will be managed throughout the various phases of the project. The proposed mitigation measures have reduced the level of the residual impacts wherever possible to a Low or Beneficial ranking. However there are certain residual impacts that remain Medium or High.

Where practical, options for environmental programmes to offset these High and Medium residual impacts are being developed.

ESIA is an iterative process. Therefore there will be continual effort to increase and further

refine knowledge of the environmental and social interactions of the pipeline before construction begins.

The mitigation measures implemented through construction and operations will be monitored and reviewed on a regular basis to ensure they are effective. Alternative measures will be applied if necessary. To ensure that the mitigation measures are implemented in the field requirements have been included within the invitation to tender for construction. Assessment of contractors approach to mitigation will form a significant component of the bid review process.

15.3 SOCIO-ECONOMIC PROJECT ASSESSMENT

Consultation revealed that 68% of interviewees in project affected communities are generally positive towards the SCP project, as their perception is that any disruption will be temporary and offset by potential economic benefits both to their community and to Azerbaijan. There will be a number of positive social impacts associated with the SCP project. These include:

- A Community Investment Programme will be developed and implemented in communities adjacent to the pipeline corridor and associated facilities (see Section 13, Cumulative Impacts)
- Direct employment – there will be a limited number of opportunities for direct employment on the project, primarily short term jobs during construction, with fewer, longer term, vacancies during operation
- Opportunity for provision of goods and services to the project
- Skills development and training, increasing the employment chances of people after the pipeline construction period
- Enterprise development, a transfer of business knowledge and skills eg internationally recognized standards of HSE, technical, commercial, accountancy, IT etc
- Infrastructure improvement – including temporary and permanent upgrade of some roads
- Benefit of the increased knowledge basis of the Azerbaijan social and economic conditions along the pipeline route, through the SCP project baseline studies – the data collected will be shared with the academic, aid agency and NGO community
- Skills transfer between international and national consultancies and social data gathering and survey techniques
- Raising public awareness of socio-economic issues in Azerbaijan, on an international, national and community level, through publication of documents and consultation.
- Utilisation in-country of international best practice in relation to land acquisition and compensation

Two of these positive aspects were particularly prominent during consultation, firstly in relation to possible employment opportunities, and secondly in relation to possible expenditure on local goods and services by construction workers.

There was clear evidence, however, of the communities having some expectations which are not achievable. Nevertheless as SCP construction will follow on immediately after BTC, it is likely that communities will develop a clear understanding of project requirements and that false expectations will be avoided.

Secondly, during preliminary consultation, 30% of villagers living in communities with poor energy supply clearly associated the construction of energy pipelines, with immediate provision of energy to their houses. After more than a year of regular consultation and with continued consultation during construction of BTC, these expectations have been, and will continue to be, informed.

During consultation, some individuals expressed concerns about pipeline construction, particularly in relation to land compensation and impacts upon local roads. Specific mitigation measures have been developed to address these issues. In addition, concerns were raised about specific aspects of construction and operation such as safety of the pipeline. These concerns were recorded in communities with a previous experience of gas explosions, although the associated infrastructure pre-dates WREP by a considerable period (1970s).

The mitigation measures outlined in this document, if effectively implemented, should mitigate the majority of these impacts successfully. Measures in relation to employment and local sourcing will go further in ensuring a positive impact spread equitably along the route.

Again, ESIA is an iterative process, and the implementation and effectiveness of the proposed mitigation will be monitored and measures taken to reinforce, adapt or change the mitigation should it be required.

Finally, one of the most crucial of the mitigation measures set out in this document is the approach to community relations. The success of many of the other social and some of the environmental measures rests on the successful implementation of the Community Relations Programme. Management plans have been developed to assist in the formulation of effective community relations by SCP Partners and the contractor. These will ensure that people working on the project and with the local communities respect the local way of life and that community concerns and their complaints are dealt with sensitively and in a timely manner.

As an offset for the disruption which will be experienced in project affected communities during the construction of the pipeline, SCP Partners will implement a Community Investment Programme which will provide small amounts of financing to many communities for priority investment and sustainable development projects.

To conclude, although there are a few residual concerns relating to the construction of the pipeline which need to be carefully managed through the mitigation measures set out in the ESIA document, it is generally anticipated that both the construction and operation will bring a series of short and long term benefits to the communities. These will focus on employment, provision of goods and services and community investment, which will provide longer term benefits to many communities thereby helping to off-set any short term negative impacts.

CONSULTATION

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16 CONSULTATION

This Section summarizes the consultation process that has been conducted at national and local levels as part of the ESIA process. It also outlines the results of that process and how they have been used to shape both the project engineering design and the development of the mitigation measures as outlined in Section 11. Following disclosure, this Section will also contain a summary of the results of disclosure including an indication as to how the comments on the ESIA have been incorporated into the ESIA.

Further details about the process to date, including details of all the organisations consulted at different stages, can be found in the PCDP, Part 8 of the Technical Appendices. The main findings from the village level consultation, have been included in Sections 8 and 9 (Environmental and Socio-Economic Baselines). A detailed explanation of the data collection process for the social baseline has been included in Section 7 (Methodology).

16.1 FUNCTION OF CONSULTATION

The aim of consultation is to understand as far as possible how the project will impact stakeholders, and to obtain their ideas and opinions on management of impacts in order to influence project design, implementation and follow-up. It is also an important opportunity for local people to become better informed about planned activities. The project has sought to carry out consultation in line with national regulations, international best practice and BP policies (see Section 6, Regulatory and Policy Framework).

16.2 SUMMARY OF CONSULTATION

This ESIA is specifically for the SCP. However, since the BTC pipeline is planned for construction in the same corridor, and requires its own ESIA, the consultation process has been combined as far as possible to ensure a consistent and coordinated approach to stakeholders. Hence, the summary of consultation conducted in Azerbaijan for both the BTC and SCP projects, is provided in Table 16.1.

Summary Table 16.1 - SCP and BTC Consultation – Azerbaijan

Phase	Type of Consultation	Date	Consultees	Forum	Methodology
Phase 1 (SCP)	Scoping Introductory Workshops	October and November 2000	National Government Stakeholders NGOs National Stakeholders (Academics and NGOs)	Meetings Workshop Focus Group	One to one meetings to discuss proposed project Presentation and round table discussion
Phase 2 (SCP)	Baseline data collection (1 st round)	November and December 2000 and	Village level Consultation with Pipeline Affected Communities. These included the villages on the Azeri-gas line as the refurbishment option was still being considered.	Interviews	Preliminary meetings with District Authorities Qualitative Interviews (607) with community members Quantitative Interviews (62) with community leaders (total number of interviews included in the final data set)
Phase 3 (SCP)	Baseline data collection (2 nd round) and preliminary development of mitigation measures	March and April 2001	Village level Consultation with Pipeline Affected Communities, following reroutes and identification of villages within the new pipeline corridor	Interviews	Qualitative Interviews (65) with community members Quantitative Interviews (6) with community leaders
Phase 4 (Combined SCP/BTC)	Consultation and baseline data collection	August 2001	Village level consultation in Pipeline Affected Communities	Interviews	Yard and camp specific qualitative interviews (120) with households potentially impacted by a pipe yard, construction camp, or access road. Quantitative interviews (11) with leaders of these communities Herder interviews
Phase 5 (Combined SCP/BTC)	Introduction to BTC. Update on SCP Distribution of combined SCP/BTC information and preliminary check on mitigation measures Additional	October and November 2001	National NGOs Local NGOs Pipeline Affected Communities	Workshops in Baku and Ganja Interviews and one to one meetings	Presentation and discussion. Update on progress of SCP, introduction to BTC and consultation on preliminary ideas for mitigation measures All identified communities (83)

Summary Table 16.1 - SCP and BTC Consultation – Azerbaijan

Phase	Type of Consultation	Date	Consultees	Forum	Methodology
	baseline data collection for newly identified communities (following reroutes)				
Phase 6 (Combined SCP/BTC)	Mitigation Additional baseline data collection	December 2001 and January 2002	Specialist Organisations Pipeline Affected Communities NGOs	One to one meetings Village meetings Combined SCP/BTC and AGI interviews in 15 communities Meeting	14 one to one meetings with specialist organisations to consult on developed mitigation measures Informal meetings in all identified communities to consult on the developed mitigation measures 72 qualitative interviews with community members in 11 communities (one in each region) concerning the fact that there are now two pipelines instead of just one, and gathering perceptions in relation to the building of an oil pipeline specifically, in addition to gas. 35 qualitative interviews with impacted community members in 5 communities concerning the construction of AGIs in their area Presentation and discussion on environmental and participation issues
Phase 7 (Combined SCP/BTC)	Disclosure	April 2002 June 2002	Environmental NGOs National Level Stakeholders Local level Stakeholders (NGOs, Interest Groups) Pipeline Affected Communities	Field Visit Public Meetings	Fact finding visit to representative sites along the pipeline corridor 3 formal public meetings in Yevlakh, Ganja and Akstafa. Presentation and discussion Road show of 10 village meetings at approximately 40 km intervals along the route

16.3 OUTCOME OF CONSULTATION TO DATE

16.3.1 Key issues

Through the analysis of stakeholder perceptions the consultation process identified a number of key issues, including both perceived benefits of the project and concerns. The issues were subsequently categorized and fed into the ESIA process and thence into the project design process with the aim of maximizing the benefits and minimizing the concerns.

Key environmental issues raised include:

- Archaeological sites and cultural reserves
- Protection of water resources (ground and surface waters)
- Ecological protection
- Nature reserves
- Reinstatement

Key socio-economic issues raised were categorized under:

- Employment
- Land Acquisition
- Access to Energy
- Local Infrastructure and Resources
- Community Relations, including relations with construction workers
- Nuisance and Safety

16.3.2 Key concerns

Once the key issues had been identified, and the project impacts analysed, mitigation measures were developed to address as many of these issues as possible. Those that could not be addressed directly, such as access to energy, have been addressed indirectly. Details of these measures are outlined Section 14 (Management and Monitoring Plan).

Refining the mitigation measures is an iterative process involving extensive consultation carried out over a period of more than a year. The consultation took the form of:

- discussions with villagers and village leaders both formally through village meetings and informally in one to one interviews at the village level
- workshops with Government and academics in Baku
- meetings with specific departments on issues such as land acquisition
- two sets of workshops with NGOs in Baku and Ganja
- one to one meetings with specialist organisations such as the BP Research and Monitoring Group
- frequent meetings with project engineers to check the feasibility of approaches and ensure feedback from external stakeholders was fed into the project design process

During those meetings, ideas for mitigation were put forward by the project and by stakeholders and gradually refined to produce the set of measures which have been included in this report. A full set of minutes of meetings can be obtained from the project on request.

Recurring themes during consultation at all levels were as follows:

16.1.1.1 Archaeological sites and Cultural Reserves

- the need to conduct pre-construction archaeological investigations
- the need to protect archaeological sites and monuments during the construction of the pipeline
- not to impact upon key features within Cultural Reserves

16.1.1.2 Groundwater

- the need to collect more data on sensitive groundwater resources in the west of Azerbaijan
- the need to protect these sensitive areas

16.1.1.3 Ecology and Nature Reserves

- to avoid impact upon Natural Reserve areas wherever practical
- to collect additional data on the ecology of the pipeline route

16.1.1.4 Reinstatement

- to prevent erosion of the pipeline corridor
- to restore infrastructure, particularly irrigation canals, to their pre-existing condition or better

16.1.1.5 Employment

- the need to recruit locally, from within the pipeline affected communities, as far as practical
- the recruitment process should be fair, equitable and overseen by an independent authority
- consultation threw up various suggestions in relation to how the actual recruitment process should be managed

16.1.1.6 Land Acquisition and Compensation

- the land acquisition process, and procedures for payment of compensation, should be fair and transparent
- there should be sufficient information provided about the process and how it would work in advance of actual land negotiations
- there should be a fair and equitable compensation process for damage to buildings and agricultural infrastructure as a result of construction activities

16.1.1.7 Access to energy

- many villagers clearly had expectations early in the consultation process of increased access to energy arising from the proximity of the pipeline

16.1.1.8 Safety

- concern about the integrity of the pipeline and whether or not villages in proximity to the line would be in danger
- concern that villagers would be injured during construction
- concern that animals might be injured on the ROW

16.1.1.9 Infrastructure

- roads should not be degraded as a result of the movements of pipe and heavy machinery, and that they should be reinstated to at least the standard existing prior to construction
- access should be maintained to grazing lands at all times

16.1.1.10 Construction Camps

- proximity to a camp was seen in a positive light
- most villagers perceived economic benefits, either directly or indirectly, from proximity to a camp
- a small number of people expressed concern about potential increases in noise, dust, crime, and damage to roads

Each of these issues had been addressed either through changes in project design or through the mitigation measures developed during the course of this ESIA process and presented in Section 11.

Consultation, with the local NGO community in particular, demonstrated a real desire on their part to have a participatory role in the ESIA process, through attendance at workshops and meetings, participating in field visits and publishing articles. There is also a strong desire amongst local NGOs to be involved in future community level consultation activities and in monitoring activities during construction and operation.

Additional details of perceptions and attitudes at the village level can be found in the Socio-Economic baseline, Section 9.

16.4 ONGOING CONSULTATION

As outlined above, consultation is an ongoing process which does not stop once the draft ESIA has been put in the public domain in May 2002. Consultation, it continues to be an integral part of the process of design, development and implementation of the pipelines project, of which the ESIA process itself is just a part.

During construction, the consultation process is handled through two mechanisms: firstly, the Community Relations Programme implemented by the Construction Contractor and monitored by SCP Partners, as outlined in Section 11; and, secondly, through the monitoring programme implemented by SCP Partners and outlined in Section 14, Management and Monitoring Plan. This plan will include consultation on how communities think the mitigation measures are being implemented. During operations, likely to begin in 2005, the consultation process will be handled by SCP Partners through the Community Relations Programme outlined in Section 11.

16.4.1 Disclosure

This draft of the ESIA document has been prepared specifically for public disclosure and comment. The report will be widely disseminated and will be available for comment for a

period of 60 days. Following the 60 day disclosure period all comments received will be incorporated as appropriate into the ESIA, prior to formal submission to the Government.

On May 15th, the draft ESIA is put in the public domain for consultation for a period of 60 days. This involves:

- Full ESIA documents are available in Azerbaijani in:
 - selected libraries, town halls, universities along the route
 - on request from BP at Villa Petrolea
 - on the world wide web at www.caspiandevlopmentandexport.com
- Copies of the Executive Summary in Azerbaijani and English are available in the same locations as the main ESIA and will also be made available to all communities along the corridor during the Road Show
- Community Pamphlets describing the impacts and associated mitigation measures of direct relevance to pipeline affected communities, specifically dealing with their concerns and interests will be available in all pipeline affected communities. They will be distributed to all communities within 2km of the route and within 5km of a construction camp or major AGI, during late May.
- Public Meetings to present the results will be held in Yevlakh, Ganja, and Akstafa during June.
- Community meetings have been proposed in the following districts (villages) during the second half of June: Shamkir (Zeyem, Kechily, Talish); Geranboy (Borsunlu); Agdash (Leki and Amirarh); Ujar (Garaberk and Karadagly); Kurdemir (Sigirly); Hadqiqabul (Mugan). Announcements of exact dates and locations for disclosure will be made through a combination of radio, the press, and on posters throughout the corridor two weeks prior to the meetings.

16.4.2 Comments during disclosure

Anyone can comment on the ESIA at any time during the 60 day public disclosure period. All comments should be put on paper and addressed to Villa Petrolea in Baku. Comments can also be made on the worldwideweb at www.caspiandevlopmentandexport.com.

On July 15th, all the comments will be examined according to the process outlined in the PCDP, Part 8 of the Technical Appendices. The ESIA will then be redrafted taking comments into account. The document will be finalized and published during the late summer and its recommendations implemented prior to construction.

16.4.3 Results of Disclosure

This section will be completed once the results of the disclosure process become available in mid-July, 2002, and included in the final draft.

ESIA CONTRIBUTORS

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17 ESIA CONTRIBUTORS

The preparation of the ESIA has been co-ordinated by AETC on behalf of SCP Partners. AETC also prepared the briefing documentation for specialist environmental consultants, as well as a number of the ESIA sections. ERM co-ordinated the socio-economic impact assessment for the project.

Table 17-1 List of participants and contributors

Specialist Consultants	Project Role
AES	Report writing and translation
AETC	Environmental Impact Assessment
Air Photo Services	Archaeology Aerial Interpretation
Alan Saunders Associates	Noise
BEC	Traffic Survey Supervision
ERM	Social Impact Assessment
Holymoor Consultancy	Hydrogeology
Hydro Scientific Limited	Hydrology
M & M Impact	IT and Graphics Support
Synergetics	Consultation and Social Baseline
UTT	Translation
WSP	Traffic Survey

In addition, the following Local Institutes and Scientists assisted through the provision of specialist services and advice (see Table 17-2).

Table 17-2 List of local institutes and scientists

Institute	Director
Baku State University (Zoology)	
Institute of Archaeology and Ethnography	Arif Abbasov
Institute of Botany	Vahid.D. Hajiyev
Institute of Erosion and Irrigation	Bahram Aliyev
Institute of Geography	Budag Budagov
Institute of Zoology	Musa Musayev
Other Organisations	
Ministry of Environment and Natural Resources	
Ministry of Culture	
BP Research and Monitoring Group	

The literature reviews used during this study were commissioned by AIOC for the WREP, and therefore are not included in this table.

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