EXECUTIVE SUMMARY

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1 EXECUTIVE SUMMARY

1.1 INTRODUCTION

The Baku-Tbilisi-Ceyhan (BTC) pipeline will be a dedicated pipeline system to transport up to one million barrels per day (bpd) – 50 million tonnes per annum (Mtpa) – of crude oil from an expanded Sangachal terminal near Baku in Azerbaijan, through Georgia to a new marine terminal at Ceyhan in Turkey on the Mediterranean coast. Tankers will ship the oil to international markets. The 1,760km pipeline is going to become operational in early 2005.

Figure 1-1 The BTC pipeline route

Engineering design work for the project has been carried out by a group of oil companies known as the BTC Owners, led by BP. Other BTC Owners are the State Oil Company of the Azerbaijan Republic (SOCAR), Unocal, Statoil, TPAO, Itochu, Ramco, Delta Hess and ENI. In mid-2002 the BTC Owners will form a company called BTC Pipeline Company (BTC Co) which will be responsible for the construction and operation of the proposed pipeline in both Azerbaijan and Georgia.

In Turkey, the design and construction of the pipeline has been contracted by the BTC Owners to BOTA[a] under a Lump Sum Turnkey Agreement (LSTKA).

1.1.1 The need for the project

The Caspian Sea region has abundant oil and gas reserves. The domestic demand for oil in the Caucuses and Central Asia is low and unlikely to grow in the near future. Most of the expansion in production will therefore be available for export, though this export potential is severely constrained owing to the landlocked geography of the Caspian, and the limited pipeline and rail networks serving the region. Oil exported from the Caspian is currently transported by rail

and/or pipeline to ports located on the east coast of the Black Sea. From here the product is either transported to other Black Sea ports for further distribution within Central and Eastern Europe, or shipped via the Bosphorous Strait to the Mediterranean Sea and then onwards to world markets.

Additional export capacity is required to accommodate new production from the Azeri, Chirag and Gunashli (ACG) field lying offshore Azerbaijan, which has forecast reserves of 4.6 billion barrels. Current production from Chirag is 120Mbd and is exported via the Western Route Export Pipeline (WREP) to Supsa in Georgia and via the Northern Route Export Pipeline (NREP) to Novorossiysk in Russia. The next development phase (Phase 1) is expected to commence production in 1st Quarter 2005, and rapid build up from Phase 2 will deliver over 800Mbd production in 2007. Plateau production of around 1 MMbpd will be reached in 2010 following Phase 3 development.

1.1.2 Project environmental and social goals and objectives

Project environmental and social goals have been agreed for BTC in accordance with BP corporate policies. The project has aimed to achieve these goals in terms of overall project design, and will continue to make progress towards them.

These include:

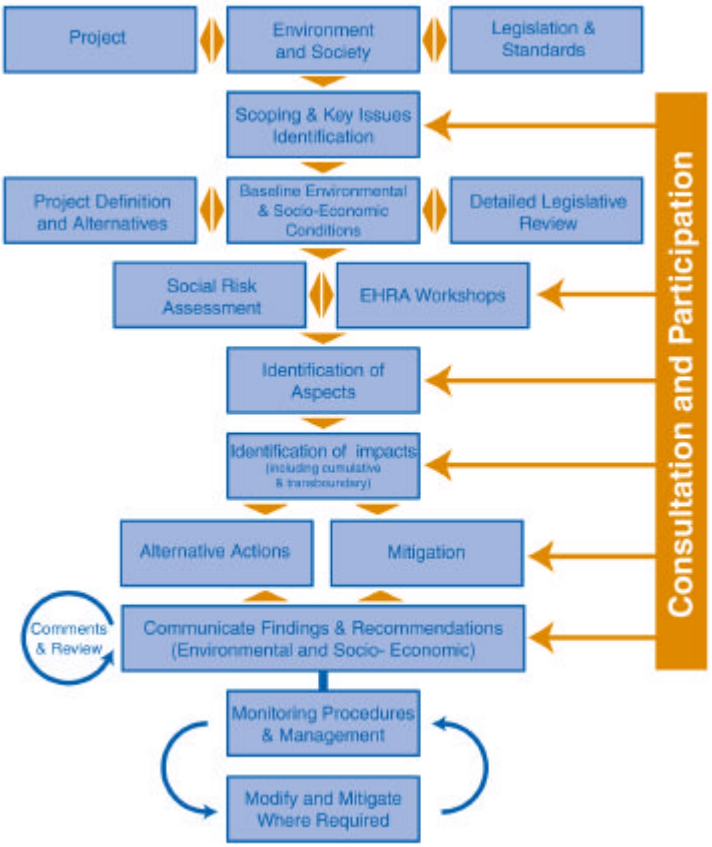
- No combustion emissions
- No loading or offloading emissions
- Zero discharge of oil or chemicals to land or surface waters
- Maximizing efficiency of net energy exported
- Minimizing project footprint (including Right of Way (ROW), temporary facilities and access roads)
- No net damage to protected ecological areas or archaeological sites
- No creation of access routes to otherwise inaccessible areas
- Restoration of habitat and hydrological regimes
- No loss of containment of product
- No resettlement of local population
- No permanent disruption to the livelihood of the local population

1.2 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

Environmental and Social Impact Assessment (ESIA) is a detailed and rigorous process with a number of sequential and inter-related steps as illustrated in Figure 1-2.

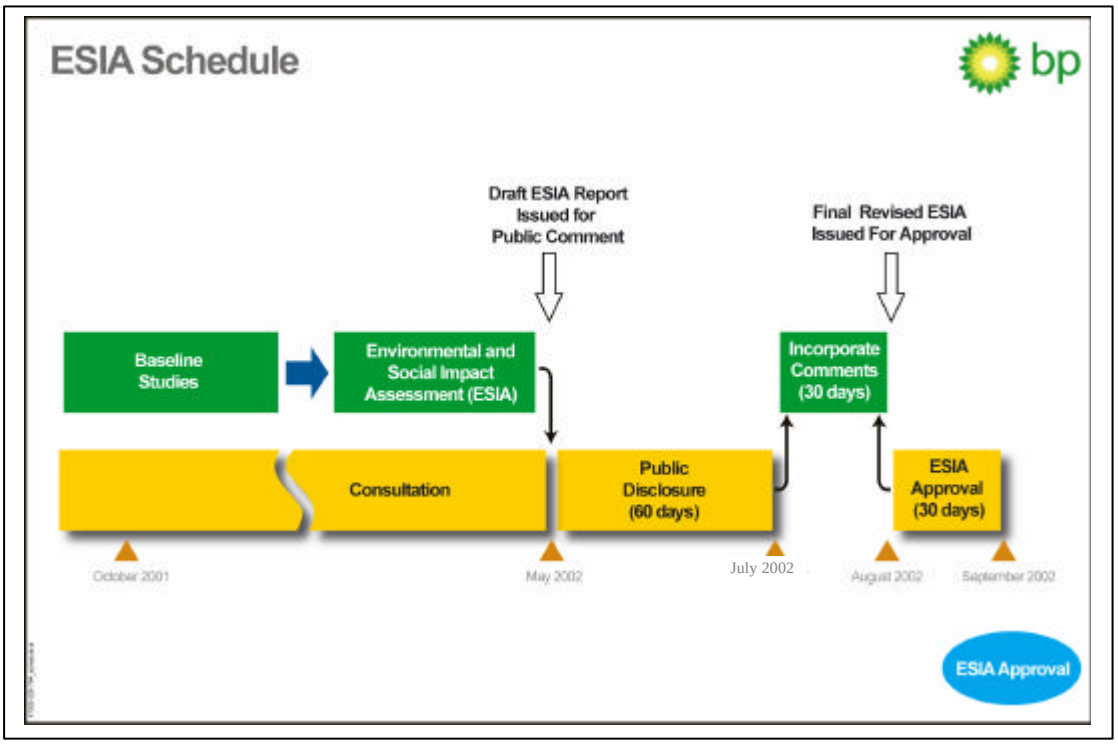
The overall objective of the BTC ESIA – relating to the onshore section of the pipeline in Georgia – is to ensure that any adverse environmental or social impacts arising from pipeline construction and operation are identified and, where possible, eliminated or minimized through early response to the issues. Another key aim is to provide a mechanism for community participation and information dissemination.

Figure 1-2 The ESIA process



Work started in 2000 on the BTC ESIA in Georgia and the subsequent schedule is shown in Figure 1-3. The ESIA report, which draws together all the findings and recommendations for managing the environmental and social impacts is scheduled for approval in September 2002. Independent international consultants, aided by a number of in-country scientists and experts, have carried out many studies and produced the resulting multi-volume document. This is available to interested parties for viewing at various locations in Tbilisi, including the BP offices, the Ministry of Environment, and regional and district headquarters.

Figure 1-3 ESIA schedule for BTC in Georgia



1.2.1 Public consultation

Consultation has formed an integral part of the ESIA process. This contributes towards potentially affected communities and individuals having a good understanding of the project, as well as early identification of issues and appropriate discussion of proposed mitigation measures. From the outset, BTC Co have sought to develop a basis of mutual respect and understanding with these communities with a view to establishing good, long-term relationships.

In addition, there is regular and ongoing dialogue with other key stakeholders in Georgia, including regulators, the scientific community and non-governmental organizations (NGOs), as well as with organizations such as the World Bank and international NGOs.

1.2.2 Regulatory and policy framework

The BTC project is being implemented within the framework of Inter-Government Agreements (IGAs) between the two transit countries. Two Host Government Agreements (HGAs) exist between the respective government of each transit country and BTC Co.

BTC Co are required by the provisions of the HGA to "draw as appropriate on international petroleum pipeline standards and experience". All ESIA work for the BTC project is being carried out in accordance with World Bank and European Bank for Reconstruction and Development (EBRD) guidelines, ensuring that good international environmental practices are adopted. As one of the most important steps of permitting, the ESIA is a prerequisite for the implementation of the BTC project.

As operator of the pipeline, BP is also committed to the highest standards of health, environmental and safety management throughout all phases of the project.

1.3 PROJECT ALTERNATIVES

1.3.1 Strategic considerations

A number of alternative oil transportation methods were assessed during preliminary work relating to Caspian crude oil export solutions. These included road, rail and new-build pipeline options as well as expansion of the NREP and/or WREP (see Figure 1-4).

This assessment took over five years, starting with consideration of the best transportation method, followed by a comprehensive assessment of the best pipeline corridor and culminating in the final route selection.

Figure 1-4 Overview map of WREP, NREP, BTC and SCP

The concept of transporting crude oil by pipeline from the Caspian to the Mediterranean, via Azerbaijan, Georgia and Turkey, was defined as the most acceptable commercial and environmental solution, and was aligned with the policies of the governments in which the BTC Owners were based. Pipelines are generally considered to be the safest, most cost effective and environmentally sound method of transporting hydrocarbons, and the routes through Georgia and Turkey were found to be commercially competitive. A key benefit offered by the proposed solution is that it avoids shipping oil through the Bosphorus Straits.

The 'no-development' option was dismissed on financial, environmental and social grounds the potential positive effects far outweighing any possible negative impacts. Although the no-development option would remove all potential environmental and social impacts owing to construction and operation, the potential positive effects including the financial benefits to Georgia arising from the transit of oil would not be realized. The no-development option would

also mean that specific environmental and social benefits that may accrue as a result of the BTC project, such as increased employment opportunities and other community benefits, would not occur.

Furthermore, without the BTC pipeline there would be increased demand for alternative export solutions from the Caspian that could lead to other projects being proposed that entail a greater degree of environmental risk, including shipping oil through the Bosphorus Strait.

1.4 PROJECT DESCRIPTION

The proposed BTC pipeline will be 1,750km long across all three countries. In Azerbaijan, the pipeline is 442km, in Georgia it is 248km, and in Turkey it is 1,060km. Construction is currently scheduled to start in the spring of 2003 and to be completed by the end of 2004.

The 42" (1,066.8mm) diameter BTC pipeline in Azerbaijan converts to 46" (1,168.4mm) diameter as it enters Georgia and reverts to 42" diameter in Turkey.

Design of the BTC pipeline is being carried out at the same time as, and in alignment with, the design work for the South Caucasus Pipeline (SCP), which will transport gas from Azerbaijan to the Georgian/Turkish Border. The proposed SCP will be 690km long and run parallel to the BTC pipeline between the Sangachal Terminal and the Georgian/Turkish border near Akhaltsikhe. The SCP has a planned completion date of one year later than the BTC pipeline and is addressed in detail in a separate ESIA report for both Azerbaijan and Georgia.

In addition to the 248km pipeline itself, permanent facilities in Georgia necessary for the BTC development will include:

- Two pump stations
- A dedicated pig launcher/receiver station along with two further pigging facilities integrated within the pump stations
- One metering station
- A number of valve stations
- A cathodic protection (CP) system
- An optical fibre communications system
- A computer-based Integrated Control and Safety System (ICSS)

The system design has been based on fully automatic operation, with centralised control provided by Sangachal Terminal communicating with Process Control Units (PCUs) at pump stations, block valves and metering facilities.

Some equipment at the pump stations will require routine manual intervention. The Sangachal Terminal and the intermediate pump stations will be permanently manned.

1.4.1 Project schedule

The design and preliminary survey work required for the BTC pipeline commenced in 2000 and is ongoing. According to project schedule estimations, construction works are estimated to begin in late 2002, and be completed by mid-2004. Cleaning and testing of the line is scheduled to occur in mid-2004, with commissioning following later that year. The construction contractor, who will be appointed in mid-2002, may determine alternative logistical

construction arrangements that alter the above proposed construction sequence. The BTC pipeline will become operational in mid to late 2004.

The overall project can be divided into four main phases: Design, Construction, Operation and Decommissioning. These phases are described below.

1.4.2 Design

Having assessed the most appropriate transportation methods for the oil and the best pipeline route, the engineering team undertook numerous studies to determine the optimum project design. This included recommendations on pipeline diameter and materials, operating pressures, flow rates, design codes and standards.

Environmental and social considerations formed an integral part of the BTC project design, which has resulted in environmental and social impacts already being eliminated in many cases throughout the design process.

1.4.3 Construction

Pipeline construction is a sequential process and comprises a number of distinct operations, undertaken by a large range of earth moving and specialist construction equipment. Average pipeline lay rates are estimated at 700m/day. A number of associated temporary facilities need to be in place prior to full construction operations commencing. These include worker camps, pipe storage yards, and waste disposal sites.

The initial activity associated with pipeline construction involves the staking of the ROW and pipeline centreline.

The ROW needs to be cleared and graded – involving the levelling of the terrain, stripping of topsoil and cultivated areas, cutting down and removal of trees, and removal of derelict buildings and waste.

Bulldozers, loaders, and backhoes are then used to level the working space and contour the ground surface. Any excess sub-soils are stockpiled alongside the ROW next to (but not mixed with) the topsoil.

Pipeline trenches will be excavated to a nominal depth of 2.2m. This will vary according to the severity of the terrain and local topography in order to ensure that the pipeline is buried with a minimum depth of cover of 1m in soil and 0.6m in rock. Deeper installation will be required at river, road, rail and other crossings. Trenching equipment will be selected to suit ground conditions and local terrain, and will likely include a combination of backhoe excavators, trenching machines, hydraulic hammers, and for rock sections, blasting equipment.

Pipe sections are transported by pipe carriers to the ROW, and laid end-to-end alongside the open trench. The pipe is joined and bent as necessary. The pipe sections are elevated on skids to allow clearance for welding, and to allow accurate alignment. The factory coating of the pipeline is inspected and repaired before a field coating is applied to all welded joints and bends. Testing of the pipeline coating is the final stage before the pipe is lowered into the trench.

The trench is then backfilled 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, washout and erosion.

The full width of the ROW and all other project areas will be reinstated. Having cleared the ROW of any residual construction debris, the surface will be restored as far as possible to its natural landform contours. Permanent erosion control measures will be installed as required, and the ROW will be reinstated including planting of vegetation.

Commissioning of the pipeline, block valves and associated AGIs ensures that the pipeline system has been constructed in accordance with the design and that the system is ready for operation. The pipeline is hydrotested by filling sections with water under pressure to ensure its integrity.

1.4.4 Operation

The pipeline system has been designed for minimal operational and maintenance intervention. Safety of operation for employees, customers and third parties, as well as environmental performance in accordance with regulatory requirements and best practice, will be priorities during this phase. Surveillance, inspection and maintenance of the BTC are important continuing activities. A system of regular inspection and maintenance will be established for the pipeline and its ancillary equipment.

1.4.5 Decommissioning

Decommissioning involves removing all hydrocarbon products 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. However, it is likely that by the end of the proposed BTC export programme, best practice techniques for decommissioning may have changed. Any abandonment plan would be supported by Best Practicable Environmental Option (BPEO) studies and an ESIA.

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, could also be considered.

1.5 ESIA METHODOLOGY

1.5.1 Environmental methodology

The assessment process consisted of the following main tasks:

- Scoping
- Detailed gathering of baseline data
- Environmental and social hazard and risk assessment workshops
- Impact assessment
- Development of mitigation measures
- Design of management and monitoring plans

Disclosure and consultation took place throughout the process and has been a central element in each of the tasks. It has included extensive local consultation with communities along the route, with government departments, GIOC and their specialist advisers, academics, and international and national non-governmental organizations. In addition, there has been frequent consultation with the project engineers to ensure the design feasibility and ultimately the practical implementation of the mitigation measures.

A similar impact assessment methodology was applied for environmental and social impacts. The project activities were considered for the main phases: construction, operation, decommissioning and unplanned events. These project activities were assessed for associated potential environmental or social impact. Potential impacts identified were analysed in detail and appropriate mitigation measures were formulated. In some cases, it was not possible to fully mitigate the impact and therefore a residual impact has been predicted.

The significance of adverse residual impacts was determined using a three-tiered ranking system of Low, Medium and High, by taking into account the severity of the impact and the likelihood of its occurrence. Beneficial residual impacts are also identified.

For the construction phase environmental assessment, the proposed ROW was divided into linear units with similar environmental characteristics, and the assessment undertaken for these units. Other areas off the ROW affected by the project activities, such as proposed worker camps and pipe yards, were also considered as part of construction phase activities. Operational phase environmental impacts mainly relate to the AGIs, including pump stations and pigging stations.

On the social side, the assessment was undertaken community by community in order to ensure that the specificities were fully understood.

1.6 BASELINE

1.6.1 Environmental baseline

It is important to identify and describe the existing environmental conditions prior to any project activities, known as the "baseline". The baseline conditions are then considered in conjunction with the project activities in order to determine potential impacts. The environmental baseline findings are summarised below.

Ecology

The proposed route is characterised by very diverse ecological conditions and by abundant biodiversity. The main areas of ecological interest along the route are listed below:

- Tetritskaro outskirts and forest: medium and high value forest, continuous in section and including endemic, rare and endangered species. The habitat also locally supports faunal diversity including endangered species of large mammals such as the brown bear
- Bedeni plateau with high mountain meadows of high conservation value and supporting abundant floral biodiversity
- Mt Taukvetili, that provides a habitat for the Georgian endemic species of black grouse
- Narianis Veli and Ktsia wetlands supporting rare high mountain wetland species and providing a habitat for migratory and breeding birds

- Tkhratskaro and Kodiana, providing a forest and alpine meadows habitat for large mammals and avian fauna
- Tsikhisjvari and Sakire forests with rare floral species and providing a habitat for mammals, amphibians, birds and other faunal groups including rare and endangered species
- Mtkvari and Potshkovi river crossings with remnants of riparian forest, supporting high floral and faunal biodiversity

Water resources

The proposed route is generally characterised by arid conditions. The route crosses a multitude of minor water courses with broad seasonal variations of surface water flow. Six major river crossings occur along the route:

Table 1-1 Major river crossings

River	KP
Mtkvari East	28.9
Algeti River	53.2
Ktsia River	137.3
Mtkvari West	220.2
Potskovi	238.87
Potskovi	243.15

Most watercourses support diverse freshwater ecology and in some instances provide drinking water for wildlife. Several wetlands are also present along the route in morphological depressions located in high mountain volcanic areas.

Groundwater along the route is also abundant and generally of high quality. The eastern part of the proposed route is characterised by a shallow water table and by localised poor quality, owing to either high salinity, biological or chemical contamination. The central part of the route is characterised by drinking water aquifers occurring in volcanic rocks and yielding numerous springs used by the local population as the main source of water supply. The western part of the route is characterised by low permeability rocks that locally overlay pressurised mineral water aquifers, including the famous therapeutic water associated with the Borjomi springs.

Geology and geomorphology

The proposed pipeline route is characterised by three main geological zones: the eastern part (KP 0-55) where sedimentary terrains prevail; a central section with predominant igneous and volcanic rocks (KP55-175); and a western section characterised by folded sequences of volcanogenic and sedimentary rocks (KP 175-248).

The route is also characterised by proximity to areas of unstable land and by a generally high seismic activity. The route selection processes has avoided such features wherever possible and, therefore, only minor instances actually affect the current route. These have been addressed in the design of the pipeline.

Landscape and visual sensitivity

Landscape types and value along the pipeline vary significantly. They include: a degraded landscape in the eastern part of the route (KP 0-70); forests and meadows in the central eastern

part (KP 70-120); volcanic features with rare biotopes and high amenity value (KP 120-175); dense coniferous forests and typical Caucasian high mountain habitats (KP 175-204); and degraded landscapes in the westernmost part of the route (KP 204-248).

The value of the landscape varies according to the degree of anthropogenic intrusion (including civil and industrial construction, power infrastructures, mining, waste disposal, and deforestation). Landscape value typically increases in the high mountain areas. The visual influence of the proposed project on the landscape will be higher in the central and western part of the route owing to the high terrain elevation and the absence of man made structures in this area.

Land use

Land use within the route is diverse. The central and eastern part of the route (KP0-116) comprises a mix of low and medium quality agricultural land interspersed with large areas of primary and secondary grazing land. Medium and high-level forest occur in the middle-western section of the route (KP187.5-204), with the alignment passing through open forest and meadow areas and a small number of closed forest areas. The western part of the route typically (KP198-248) comprises meadow and pasture land and to the west, semi-arid scrubland.

Archaeology and cultural heritage

The proposed route encroaches on several areas of known archaeological interest and areas where potential additional finds could occur during excavation works. The known and potential archaeological features span from the 5th millennium BC to medieval time and include some outstanding examples of Georgian heritage.

The baseline characterisation has highlighted a number of sites where subsurface archaeological investigations will be undertaken to further define the local archaeological wealth and suitably manage the resources.

Traffic and transportation infrastructure

The road network in Georgia is characterised by widespread poor road conditions and, with the exception of the main arteries of communication, the conditions are unsuitable for sustained heavy vehicle traffic.

Climate and meteorology

A desk based study and assessment has been undertaken using available historical data for various climatic zones along the ROW. In addition, field data was collected.

Air quality

Long term measurement of air quality has been undertaken, and demonstrates air quality is currently very good at proposed locations of major facilities associated with the pipeline.

Noise

Baseline measurement of noise has been undertaken at the proposed sites of temporary construction facilities, and of pump stations. Baseline measurements indicate noise levels are currently very low, and representative of typical rural environments.

Soil

A detailed soil survey along the proposed route was undertaken enabling soils types to be characterised and described. The types of soils which are present include brown sierozem with saline soil complexes, alluvial carbonate and non-carbonate soils, solonetz and saline soils, peat-rich carbonate soils, brown soils, black and peat-rich mountainous-meadow soils, peat-rich and primitive mountainous-meadow soils and brown forest soils.

The proposed ROW is characterised by terrains with predominantly low risk of soil erosion in the eastern part of the route, and with high to very high risk of erosion in the central and western part of the route. The risk of erosion is exacerbated by the presence of steep slopes in high mountainous areas.

1.6.2 Socio-economic baseline

Data on existing social and economic conditions, and attitudes to the project, were gathered through interviews and consultation in every community within a 2km either side of the centre of the pipeline corridor, 5kms of major AGIs and worker camps, and 2kms of potential pipe yards. Approximately 700 quantitative and 350 qualitative interviews were conducted in 72 communities.

Statistical and qualitative information was also gathered from documented information sources, such as national and census data and international sources such as the World Bank and the CIA World Fact book.

Results

Georgia has had a turbulent history since the Soviet Union dissolved in 1991. After independence, a lack of confidence in the economy and the disappearance of Soviet support, led to an industrial decline of 90%, and an associated fall in standards of living. However, the past five years have seen increasing stability and rising levels of GDP.

Georgia has a population of approximately 5 million. The study area covers two regions (Kvemo Kartli in the south-east and Samtskhe Javaketi in the south-west) including seven districts, and has a population of approximately 425,000. Most communities on the pipeline route have seen a decline in numbers in the last ten years, mainly as a result of out-migration of young people looking for work. The communities are, therefore, seeing an ageing of the population, particular in Tetri-Tskaro and Tsalka Districts, where pensioners make up 30% of the inhabitants surveyed.

One of the major constraints on quality of life is lack of energy, with almost all communities receiving infrequent electricity supply and a small minority receiving no electricity at all. Only ten villages have gas pipeline networks. Wood is the primary energy source for cooking and heating, and is cut and gathered by the communities themselves. Gas is used almost exclusively for cooking, and rarely heating, owing to the high cost. Almost all communities complained of

infrequent supply of running water in their houses, with 40% receiving none at all. Irrigation is also a major problem owing to the unreliable water supply infrastructure that is not maintained or is non existent.

Transport infrastructure is also very poor with roads that are severely pot-holed. There are almost no refuse or sewer systems in surveyed communities. Many services, such as fire protection and banks are virtually non-existent. Police services and health clinics are severely degraded and in need of major investment.

Georgia is an ethnically diverse country. Of the surveyed communities, 43% are Georgian, 25% are Armenian, 16% are Azeri, 15% are Greek, and the remaining 7% are Russian and Belorussyan. Villages tend to be dominated by one ethnic group. The majority of the population is Orthodox Christian, but religion varies significantly by district. For instance, 93% of the population in surveyed communities in Borjomi is Orthodox Christian, while nearly 100% of the population in surveyed communities in Marneuli is Muslim.

The majority of the pipeline-affected communities rely on subsistence agriculture or agriculturally based livelihoods. In general, people use state land for pasture and timber harvesting, but own the land that they cultivate. The average total size of land owned or used per household in the surveyed area is almost one hectare.

Approximately 80% of the adults surveyed are unemployed or under-employed. Average household income in the surveyed area was 253 GEL/month (approximately US$113). Though few people are formally employed, the biggest portion of that comes from wages, rather than from selling agricultural products, as wages are so much higher than income earned in this way. Only 3% of people interviewed reported to being employed in the private sector.

1.6.3 Attitudes to the BTC project

People are generally optimistic that the construction and operation would bring both direct and indirect benefits. Employment was overwhelmingly the most important benefit perceived from the construction and operation of the BTC pipeline. Compensation for the land used during construction and operation is very important to the respondents, and the improvement and repair of roads was also considered to be significant, particularly during the construction phase. Other perceived benefits were improved access to energy, and improved living conditions. Respondents had the impression that the operation of the pipeline would result in the same benefits associated with the construction phase. Concerns were raised in many of the communities, but in the majority of cases, the perceived benefits outweighed the concerns.

1.7 IMPACTS AND MITIGATION

1.7.1 Environmental impacts and mitigation

The project approach has been to design the route and the pipeline so that impacts would be avoided, eliminated or minimised. At the highest level, the early identification of communities, sensitive areas, protected areas, archaeological sites and geohazards has enabled the route to be selected to avoid sensitive areas and issues such that impacts were eliminated in many cases, and minimized in others. At the design stage, knowledge of environmental constraints has enabled selection of the construction technique that best suited the local environmental issues.

Similarly, the siting and the design of the operational facilities have taken into account the location and sensitivity of human and ecological receptors. Specific mitigation measures have been built into the design to reduce impacts.

The sections below summarise the evaluation of the project activities and associated potential impacts during construction and operation of the pipeline, including unplanned or accidental events. Mitigation measures to address the potential impacts are then described.

1.7.1.1 Pipeline construction

The following project activities have been identified:

- A Haulage
- B Roads construction
- C ROW clearance
- D ROW preparation
- E Trenching
- F Pipe laying
- G Backfilling
- H Temporary reinstatement
- I Final reinstatement
- L Fuelling
- M Hydrotesting
- N Horizontal Directional Drilling (HDD)
- O Horizontal boring
- P AGI and facilities construction
- Q Waste generation

Table 1-2 contains a list of the general mitigation measures required to minimise the potential impact of the construction activities listed above.

Table 1-2 Mitigation measures

Project Activities / Environmental Aspects	Environmental Receptor and Potential Impact	Proposed Mitigation Measures
		Mitigation measure no. 1
C. ROW Clearance	Ecology, fauna, flora Habitat loss	Undertake pre-clearance surveys to identify, transplant or otherwise manage rare and endangered botanical species and fauna that are likely to be affected by the clearance operations
		Mitigation measure no. 2
C. ROW Clearance	Flora, ecology landscape and visual intrusion Loss of standing timber in forests	The trees along forested areas of the ROW will be felled as part of the clearance operation and sold as valuable timber, where possible. Small branches are to be provided to local communities for firewood. A suitable number of trees will be replanted for every tree felled as part of the ROW (or AGI locations) clearance operations. To ensure the restoration of ecological balance, compensation planting at a ratio of 1.5:1 will be carried out (ie 150 trees will be replanted for each 100 trees felled)

Project Activities / Environmental Aspects	Environmental Receptor and Potential Impact	Proposed Mitigation Measures
		Mitigation measure no. 3
B. ROW Clearance	Ecology, flora, soil erosion, landscape and visual intrusion Habitat loss	Reinstate the ROW with suitable floral species to reflect endemic characteristics and overall habitat characteristics. Apply site-specific reinstatement provisions depending on the sensitivity of the area to soil erosion
		Mitigation measure no. 4
C. ROW Clearance and D. ROW Preparation	Flora, ecology Loss of species of high conservation value	Undertake conservation projects to preserve specimen and stimulate conservation of rare and endangered species disturbed as part of the ROW clearance process
		Mitigation measure no. 5
A. Haulage; B. Roads Construction	Flora, ecology Habitat loss	Reinstate any temporary access roads or temporary facilities to pre-existing conditions in ecologically sensitive areas. In non-ecologically sensitive areas, roads may be left for community use as agreed as part of the community investment/community relations strategy
		Mitigation measure no. 6
A. Haulage, B. Roads Construction C. ROW Clearance and D. ROW Preparation, E1. Blasting and E2. Mechanical Trenching, G. Backfilling, H. Temporary Reinstatement and I. Final Reinstatement	Fauna, ecology Disturbance to rare or endangered species	Undertake pre-clearance bear survey to evaluate whether construction during the winter and early spring times could have detrimental effects on the bears populations. Take adequate action if survey results indicate abundance of bears in the ROW proximity. Install soft plugs in trench to allow trench crossing by wildlife. Restrict ROW in some forest areas to reduce clearings between continuous segments
		Mitigation measure no. 7
C. ROW Clearance and D. ROW Preparation	Fauna, ecology Habitat fragmentation as a result of ROW establishment through forest areas Disturbance to wildlife sanctuaries	Promote and undertake wildlife monitoring programme in forest areas and wetlands to promote the conservation of endangered species. The target species for this programme will include: • Migrating birds at river crossings and in wetland areas • Brown bears and other large mammals if pre-clearance survey shows evidence of the animal's presence in the proximity of the ROW

Project Activities / Environmental Aspects	Environmental Receptor and Potential Impact	Proposed Mitigation Measures
		Mitigation measure no. 8
D. ROW Preparation, E. Trenching, Drilling	Fauna, ecology, water resources (groundwater) Disturbance to watercourses and wetlands	Avoid wetlands though minor re-routes. Undertake river crossings so that minimal disturbance to fish is incurred. The measures to be adopted include: • Construction will take place preferably during low flow periods, most likely during the summer season • Continuity of water flow to be ensured through diversion of main river channel away from construction area • Sediment control measures to be enforced. These will include straw bales, silt fences and settlement lagoons depending on river characteristics and seasonal conditions • Prohibition of fuelling and other potentially contaminating operations within floodplain
		Mitigation measure no. 9
P. Construction of AGIs, M. Hydrotesting	Water resources ecology, fauna Discharges of sewage, oily water and chemicals to water courses	Ensure that discharge of sewage from the temporary construction facilities (camps, pipe yards, supply base in Poti) and hydrotest water to surface courses does not impact surface water ecology. This will be achieved through the provision of treatment facilities and by enforcing the discharge standards
		Mitigation measure no. 10
M. Hydrotesting	Water resources, fauna, flora Disturbance of water balance on small lakes and surface water courses	Ensure that abstractions and discharges of hydrotest water are licensed and do not impact hydrological balance of local surface water features. This will be achieved through the selection of the abstraction locations on the basis of the hydrological and ecological characteristics of the water body and by complying with all the criteria required to obtain an abstraction permit
		Mitigation measure no. 11
C. ROW Clearance and D. ROW Preparation	Soil erosion, water resources Erosion of ROW during winter season and after construction	Implement reinstatement plan after each construction season. A temporary reinstatement plan will be developed for sections of the ROW that are likely to undergo severe erosion during the winter season if no temporary measures are adopted. A permanent reinstatement plan will be adopted to the entire ROW based on the site-specific soil conditions and topography

Project Activities / Environmental Aspects	Environmental Receptor and Potential Impact	Proposed Mitigation Measures
		Mitigation measure no. 12
C. ROW Clearance and D. ROW Preparation, H. Temporary Reinstatement	Soil Loss of topsoil and deterioration of physical structure, loss of fertility and productivity	Stabilize topsoil stockpiles along the ROW
		Mitigation measure no. 13
L. Fuelling, Q. Waste Generation	Water resources, contamination of land Spillage of fuel or other liquid contaminants	Adopt strict fuelling and spill control procedures in areas where sensitive groundwater resources occur. The construction contractor is to prepare a spill response plan for the pipeline construction phase
		Mitigation measure no. 14
E. Trenching	Water resources Contamination of shallow groundwater, localised disturbance of shallow groundwater wells	Ensure adequate management of groundwater occurring in the pipeline trench. Depending on the permeability of the soils, the depth of groundwater and the site-specific construction requirements, the contractor may have to de-water the trench thus potentially causing localized short term changes of the hydrogeological regime. To minimize adverse impacts from these operations the contractor will be required to discharge any abstracted groundwater to the ground or in sections of the trench where work is not being carried out. This will ensure negligible or reduced losses of groundwater from the local hydrogeological system
		Mitigation measure no. 15
C. ROW Clearance and P. AGIs Construction	Landscape and visual Intrusion Visual intrusion along ROW. Longer term landscape impact at AGIs and in areas of high landscape value	Implement landscaping plan for all AGIs (see site specific mitigations) and for all areas where high landscape value and visual vulnerability to the proposed ROW clearance warrants site-specific landscape restoration measures

Project Activities / Environmental Aspects	Environmental Receptor and Potential Impact	Proposed Mitigation Measures
		Mitigation measure no. 16
D. ROW Preparation and E. Trenching	Archaeology and cultural heritage Disturbance of known monuments and management of archaeological chance finds	Implement Cultural Heritage Management Plan for priority sites identified as part of baseline study, as well as construction phase finds. Additional archaeological resources are likely to be identified during the early phases of construction. These would include previously known sites that prove to be more extensive than was previously known and site that have not been identified in any way previously. It is likely that these additional resources would include pre-Bronze Age sites, whose structural remains would be more limited because they predate the introduction of cyclopean stone construction. These pre-Bronze Age sites, although physically less substantial, could well be significant, therefore also meriting protection. Such chance finds would be recorded and verified by archaeologists who will be employed to keep a watching brief on the construction process. Site evaluation and potential mitigation of impacts to such sites would, if possible be addressed between the time of discovery and the start of grading and pipe-trench excavation in the site area. In cases where time limitations prevent this, BP has planned for construction "work arounds" to allow additional archaeological mitigation by data recovery as necessary. These late discovery protocols will be in place prior to the start of construction as part of the projects management plans
		Mitigation measure no. 17
A. Haulage, D. ROW Preparation, E. Trenching G. Backfilling	Air quality Emissions to atmosphere	All new vehicles will comply with all relevant EU directives for emission standards. A regular maintenance programmes for all mobile and stationary plant will be undertaken to minimise potentially polluting exhaust emissions. Vehicle re-fuelling will be undertaken to prevent fugitive emission of VOCs
		Mitigation measure no. 18
A. Haulage, B. Roads Construction D. ROW Preparation, E. Trenching, G. Backfilling	Air quality Emission of dust	When working in dry soils or where construction activities generate airborne dusts, dust suppression techniques will be undertaken where human, plant or animal receptors lie within 300m of the ROW

Project Activities / Environmental Aspects	Environmental Receptor and Potential Impact	Proposed Mitigation Measures
		Mitigation measure no. 19
A. Haulage, D. ROW Preparation, E. Trenching, G. Backfilling, N. and O. Drilling, P. AGIs construction	Noise and vibrations Noise generation resulting in disturbance to human and wildlife receptors	Limit the working hours of noisy activities when near the identified sensitive receptors to normal daytime working hours. Select the most appropriate equipment for the task considering the lowest sound power level and maintaining such equipment so that it does not create unnecessary noise owing to mechanical faults. Operate such equipment in a manner sympathetic to the ambient noise environment. Do not leave equipment idling unnecessary; do not rev engines unnecessarily. Eliminate tonal, impulsive or low frequency noise through noise control engineering techniques where practicable (fitting of mufflers, damping, etc), and substitute for a different method if necessary (eg instead of hammering actions use hydraulics). Provide adequate warnings of impeding works to all potential receptors within a 1km corridor surrounding the ROW via public notices and local news
		Mitigation measure no. 20
A. Haulage; L. Pipe Laying	Traffic and transportation infrastructure Traffic generation	Development and implementation of transport management plan with the objective of maximising safety and minimize disturbance to existing road network
		Mitigation measure no. 21
A. Haulage; L. Pipe Laying	Traffic and transportation infrastructure Traffic generation	Repair access roads prior to commencement of construction
		Mitigation measure no. 22
Q. Waste Generation	Waste management Waste generation storage and transport	Implement Waste Management Plan (procedures for the classification storage and disposal of all construction wastes; training of employees who handle hazardous materials). The contractor will select a suitable location for the construction and operation of a hazardous waste disposal site

The impact assessment process has also included a number of non-ROW construction related activities:

- Use of the port supply base
- Establishment of construction worker camps and pipe storage yards within Georgia
- Development of borrow pits and spoil disposal sites
- Development of waste disposal sites

The potential environmental impacts and mitigation measures proposed for the non-ROW construction activities are presented in the following table.

Table 1-3 Summary of mitigation measures for off ROW sites

Project Activities / Environmental Aspects	Environmen-tal Receptor and Potential Impact	Proposed Mitigation Measures
Shipping movements; fuelling	Fuel spillage to port waters	Adopt strict fuelling and spill control procedures. Construction contractor to prepare spill response plan
Pipe & equipment off-loading from ship and onward rail transport	Noise nuisance	Off-loading will take place during daylight hours only. Current noise and activity levels at the port will not change significantly
Ship ballasting	Ballast discharge to port waters and to return waters	Ships used for the project will use water ballast only. On arrival at the port, they will have little or no ballast thus there will be minimal ballast discharge on arrival. Water ballast taken on board from the Black Sea is regarded as polluted water therefore any ballast discharged in return waters will be regarded as wastewater and treated and disposed of accordingly
Clearance of lay down and camp areas	Habitat loss	Site selection: all sites are characterized by habitats of little or no conservation value. Andezit and Tsikisjvari are characterized by the presence of degraded meadows of low conservation value
Establishment and operation of storage yards & worker camps	Visual intrusion in areas of high landscape quality	All sites, with the exception of Andezit and Tsikisjvari, are located in areas of low to medium landscape quality; Implementation of reinstatement plan
Increased vehicle and personnel movements at pipe storage yards and worker camps	Noise emissions resulting in disturbance to nearby human and wildlife receptors	Limiting the working hours of noisy activities to normal daytime working hours. Provision of warnings of impeding works to all potential receptors within a one kilometre radius of the sites
Sanitary waste generation at workers camps	Accidental spillage of waste and potential impact on surface and ground water	At all worker camps, a sewage treatment package will be established to treat waste. The package will meet the project discharge standards

Project Activities / Environmental Aspects	Environmen-tal Receptor and Potential Impact	Proposed Mitigation Measures
Excavation; opening or closing discontinuities (ie joints, fractures, fissures) in rock masses at borrow pits	Change in either the rate of rainwater percolation or groundwater flow paths and directions	Stringent site selection and screening; Additional specialised studies of the hydrology and hydrogeology will be undertaken in sensitive areas; The base and sides of spoil disposal sites will be lined with impermeable material
Vehicle movements; vehicle fuelling	Potential for pollutants to enter surface water courses or aquifers	All vehicle fuelling will be done on contained hard-standing areas
Increased vehicle and personnel movements at borrow pit and spoil disposal sites	Noise emissions resulting in disturbance to nearby human and wildlife receptors	Limiting the working hours of noisy activities to normal daytime working hours. Provision of warnings of impeding works to all potential receptors within a one kilometre radius of the sites
Clearance, excavation at borrow pit and spoil disposal sites	Earth moving operations may reveal the presence of archaeological sites	Site selection: no known archaeology located in proximity to all preferred sites. Implementation of Cultural Heritage Management Plan
Establishment of sites; vehicle and personnel movements at borrow pit and spoil disposal sites	Visual intrusion in areas of high landscape quality	Implementation of Reinstatement Plan
Waste storage and containment at waste disposal sites	Leakage of contaminants to surface water & groundwater	Adoption of strict re-fuelling procedures.
Haulage and handling of waste at waste disposal sites	Noise generation	Noisy work conducted only during daylight hours
Site establishment & operation at waste disposal sites	Visual intrusion in areas of high landscape value	Implementation of Reinstatement Plan
Clearance, excavation at waste disposal sites	Earth moving operations may reveal the presence of archaeological sites	Site selection: no known archaeology located in proximity to all preferred sites; Implementation of Cultural Heritage Management Plan

1.7.1.2 Pipeline operation

During normal operation of an oil pipeline relatively limited activities take place. In the case of the Georgian section of pipeline, which has a transit role, operational activities are restricted.

A summary of facilities, and details of their operation, is presented below.

- Pump stations PSG1 and PSG2 which are required for pumping of export crude downstream
- Intermediate pigging station required for de-waxing of the pipeline
- Block Valves: Minor installations, required for isolation of route sections for safety, or maintenance purposes
- Other Operations such as inspections and operational testing: requires the operation of road and off-road vehicles and access to the ROW

Table 1-4 Summary of facilities and activities associated with operational phase

Facility / Operation	Activity
Operations of PSG 1 and PSG2	Operation of mainline pumps by turbine drivers
	Operation of crude topping plant
	Generation of site electrical power
	Operation of waste water treatment system
	Operation of site vehicles
	Pigging
	Site storage
Operations of IPS 1	Generation of site power
	Pigging
	Operation of waste water treatment system
	Operation of site vehicles
Block valves	Generation of site power
	Site storage
Other operations	Pipeline surveillance
	Site storage
	Delivery and transport
	Crude Topped Distillate (CTD) transport

1.7.2 General operational mitigation measures

General mitigation measures applicable to one or more of the operational facilities or activities, and are presented in Table 1-5.

Table 1-5 General operational mitigation measures for pipeline operation

Project Activities / Environmental Aspects	Environmental Receptor and Potential Impact	Proposed Mitigation Measures
		Mitigation measure no.1
Operations of AGIs	Flora hydrology 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
		Mitigation measure no. 2
Pipeline inspection	Flora Soil erosion and habitat deterioration	No vehicular access on reinstated ROW other than in case of emergency, or inspection and maintenance. The majority of inspection will be done on horseback. The restriction to vehicles 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
		Mitigation measure no.3
Maintenance of ROW	Flora Soil erosion and habitat deterioration	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
		Mitigation measure no. 4
Operations of AGIs and pipeline	Flora hydrology hydrogeology Contamination of soil, water and plants	Undertake suitable clean up operations and reinstatement in case of oil spill. This will involve delineation of contaminated areas and excavation and disposal at an appropriate facility. Where appropriate, other methods of remediation will be applied (eg in-situ bioremediation)
		Mitigation measure no. 5
Operations of AGIs	Fauna Noise disturbance	Adopt noise suppression technologies for pump station drivers and valves generators. 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
		Mitigation measure no. 6
Operations of AGIs	Fauna Visual disturbance	Adopt suitable lighting (vertical diffusion lighting) to minimise glow effect of pump stations (particularly PSG2) at night
		Mitigation measure no. 7
Physical presence of AGIs	Fauna Impacts to bear populations	Implement fauna monitoring programme

Project Activities / Environmental Aspects	Environmental Receptor and Potential Impact	Proposed Mitigation Measures
		Mitigation measure no. 8
Pipeline operation	Hydrology Scour or other source of damage to pipe and consequent oil spill	Undertake periodic monitoring of river crossings and gorge crossings for signs of instability. This will be undertaken as part of pipeline surveillance
		Mitigation measure no. 9
Operations of AGIs	Hydrology, flora, fauna Contamination of Surface water	Monitor discharges of treated effluent. Monitoring requirements and frequency will be reflected in Environmental Management System
		Mitigation measure no. 10
Pipeline operation	Hydrogeology, hydrology Contamination of groundwater and surface water	Implement security/inspection programme along sections of the ROW crossing sensitive aquifers
		Mitigation measure no. 11
Physical presence of pipeline ROW	Landscape Visual impact of ROW after reinstatement	Monitor and maintain reinstated planting. This will be undertaken as part of the pipeline surveillance. Continued erosion control will be implemented through the use of diverter berms, gabion mattresses, silt fences and trench breakers
		Mitigation measure no. 12
Physical presence of AGIs	Landscape Visual impact	A landscaping plan will be implemented which will use grass, shrubs and trees, where practicable, to screen the AGIs and associated access roads. These plans will be integrated at the design stage for major AGIs (pump stations and IPSs) and at construction stage for other AGIs. Screening will be subject to ongoing monitoring. Other mitigation measure applicable to all AGIs are: Building and facility walls, and the perimeter wall will be finished in colour and style sympathetic to surrounding landscape where practicable; The height and mass of buildings will be minimised, for example by using pitched roofs where possible; Built structures, fences and gates will be painted using colours sympathetic to the surrounding environment; Site lighting (where applicable) will be designed and located to reduce off-site glare to a minimum, and minimise the impact on visual amenity at night, having regard to security and safety requirements

Project Activities / Environmental Aspects	Environmental Receptor and Potential Impact	Proposed Mitigation Measures
		Mitigation measure no.13
Pipeline operation	Heritage and Archaeology Contamination of monuments in case of oil spill	Include archaeological and heritage sites in list of resources to protect in Oil Spill Response Plan
		Mitigation measure no.14
Operations of AGIs - Power Generation	Air quality Emissions from power generation units	Undertake emissions monitoring of combustion plant on an annual basis for NO_x, SO_2, CO, and particulate matter
		Mitigation measure no.15
Operations of AGIs - Turbine driver and CTD operations	Air quality Emissions from major combustion plant	Emissions from major combustion plant to be released to atmosphere via an appropriately designed stack. Stack heights have been designed using two methodologies: Major sources: Stack design achieved using a dispersion model, which considers local meteorological conditions, buildings and includes emissions from multiple points. Minor sources: Stack heights have been design using UK Environmental Agency's D1 methodology
		Mitigation measure no.16
Operations of AGIs	Air quality Emissions of SO_2 from combustion plant	All combustion plant, where practicable, to operate on CTD with a maximum sulphur content of 0.2%. This will lead to a reduction in concentrations of SO_2 in combustion plant emissions, as compared to operation of commercially available diesel fuels within Georgia. It is very likely that CTD will be less than 0.1% sulphur, given the sulphur content of ACG crude oil (the mainline crude sulphur content is directly proportional to CTD sulphur content)
		Mitigation measure no. 17
Operations of AGIs	Emissions from major thermal combustion plant	Combustion plant to be dual-fuelled and will operate on natural gas as soon as practicable when an appropriate source becomes available. This will lead to a reduction in NO_x, SO_2, particulate matter, and achieve a greater operational efficiency that operation of CTD
		Mitigation measure no.18
Operations of AGIs	Air quality Emissions from power generation units	Undertake preventive maintenance to minimise fugitive emissions and maintain performance of emission abatement technology. Fugitive losses from crude export are not normally associated with a significant environmental impact, however, this may be important for minimisation of nuisance from odour

Project Activities / Environmental Aspects	Environmental Receptor and Potential Impact	Proposed Mitigation Measures
		Mitigation measure no.19
Operations of AGIs	Waste management General	Ongoing training for site personnel. Training will comprise health and safety, hazardous materials handling, waste management, environmental compliance and reporting
		Mitigation measure no.20
Operations of AGIs	Waste management Generation of operational waste at Pump Stations and other AGIs	Implement Waste Management plan (procedures for the classification storage and disposal of all operational wastes; training of employees who handle hazardous materials). This will include the correct storage, labelling, and segregation of waste for appropriate disposal
		Mitigation measure no.21
Operations of AGIs	Soil and water contamination Spills and leaks at AGIs	Provide secondary containment for all petroleum containing tanks at Pump Stations and valve stations. Secondary containment will provide at least 110% of storage unit / tank capacity (particularly at sites of high rainfall)
		Mitigation measure no.22
Operations of AGIs	Soil and water contamination Spill from pipeline	ICSS and associated Leak Detection System. Leak detection systems for project operation are currently under development
		Mitigation measure no.23
Operations of AGIs	Soil and water contamination Spill from pipeline	Develop and implement an adequate Oil Spill Response Framework Plan
		Mitigation measure no.24
Operations of AGIs	All Operational activity	Develop Environmental Management Plan

1.7.2.1 Unplanned events

The potential for accidental events and the consequences of such accidents were also analyzed with the aid of mathematical models that simulate the behavior of the spilled oil in case of accident. The assessment shows that this is an extremely unlikely event. However, depending on the location of the accident site and the concurrent meteorological conditions, an oil spill may have very negative consequences.

Specific mitigation measures have been developed and will form part of the oil spill response plan to protect most vulnerable or sensitive resources such as the groundwater and freshwater systems in the Borjomi region.

1.7.3 Socio-economic impacts and mitigation

The table below summarises the social impacts and mitigation measures. The majority of social impacts will take place during the construction phase, with relatively few impacts associated with the operational phase.

Table 1-6 Summary social impacts and mitigation measures

Aspect/ Issue	Impact	Mitigation Measures
Employment and local sourcing opportunities	Short term employment for unskilled workers in construction phase (typically 1-3 months) (positive)	BTC Co and contractor to agree plan for local labour content
	Medium term employment for skilled workers in construction phase (typically 12 months) (positive)	Preference given to applicants from pipeline affected communities
	Direct and indirect employment of up to 100 workers in operation phase (positive)	Recruitment procedures to be transparent and fair
		Contractor to develop training programme for local workers
	Opportunity to provide goods and services to project in construction phase (positive)	Contractor to draw up plan to maximize local sourcing opportunities
Land and Land Based Livelihoods	Permanent expropriation of land	Compensation process developed for land owners and land users
	Temporary loss of land and resultant impact on livelihoods	Grievance procedures drawn up to resolve disputes
	Temporary and permanent damage to crops	Rules set out for contractor to minimise damage
	Damage to infrastructure (property, irrigation canals, etc)	Engineering procedures to manage crossings of irrigation canals and other infrastructure and services
Infrastructure and Resources	Improvements to infrastructure, particularly roads, needed for construction (positive)	No net loss philosophy in quantity or quality of infrastructure wherever possible
	Damage to infrastructure, loss of resources or loss of access to infrastructure and resources as a result of construction activities that are not carefully managed	Improvement to existing access roads; maintenance of roads, and restoration of damage to roads caused by project
	Roads: damage to and / or up-grade of existing roads; construction of new roads; and traffic safety	Documentation of quality of roads prior to and after project
		Contractor to draw up Transport Management Plan, including focus upon community safety

Aspect/ Issue	Impact	Mitigation Measures
		Safety training on road safety awareness for local communities
	Open Trench during construction of the pipeline poses a safety risk to people and livestock	The amount of trench open at any one time is expected to be limited to 15km (only 10km in continuous stretches) Stock proof fencing in areas of risk for livestock, crossing points fenced and watchmen at night time
Construction Workers and Community Relations	Potential community discontent from disturbance during construction process	Contractor to draw up Community Liaison Management Plan and Worker Camp Management Plan Community Liaison team: four employed by contractor, five employed by BTC Co in construction phase
	Potential for increased crime, drug and alcohol use	Code of Conduct for camp workers, camp rules and disciplinary procedures
	Cultural differences from potential in-migration, as a result of worker camps	Cultural sensitivity training for all workers
	Possible spread of HIV/AIDS and other communicable diseases	Health Awareness Training for workers and communities

An additional major issue identified was access to energy owing to the limited availability of energy to communities on the pipeline route, caused by inadequate supply, lack of infrastructure and an inability of local households to pay. The concern of communities in this instance is not the impact of the project on energy availability, but that there are opportunities for increased access to energy. However, BP is collaborating with and supporting those within the government tasked with that the implementation of this responsibility. Also, the Shah Deniz Georgia Host Government Agreement (HGA) includes a provision for gas supply from the project to Georgia.

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

- Direct employment of operational staff (approximately 100) (positive)
- Skills enhancement from long term employment opportunities (positive)
- Restrictions on land use on ROW (no trees directly above pipeline, no new buildings, no deep irrigation channels, etc)
- Water consumption at AGIs

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

1.8 CUMULATIVE IMPACTS

The cumulative environmental and social effects of the project are considered at three spatial levels: regional, national and route level. At regional level the effects of BTC have been evaluated in combination with the other oil and gas development in the region. In this context, the contribution of BTC in Georgia to the overall cumulative impacts associated with these activities is negligible.

At national level, no cumulative effects of significance would result from routine operation of the BTC project.

At the route level, the project's main interaction is clearly with the SCP, which will share the same corridor as BTC. The BTC project also interacts with the WREP where the two pipelines follow the same route from the border between Georgia and Azerbaijan until approximately KP 20. The main cumulative impacts at route-level are summarised below.

Land take and subsequent habitat loss

The combined corridor for the two pipelines will take up a 44m wide band of land along the ROW and, therefore, any loss of habitat that would have resulted from a single ROW (32m) is augmented by 12m as a consequence of the coexistence of the two projects. This effect has significant consequences with regard to the potential for habitat fragmentation. There may also be consequences with regard to impacts to wildlife and to biodiversity, particularly in forest areas where the ROW will create a break in the habitat continuity. However, the combined corridor of 44m is less than would have otherwise been required if the two pipelines used two separate corridors of 32m. Hence, the combined corridor has allowed for a net reduced impact than there otherwise would have been.

Delayed reinstatement of the ROW

The co-existence of the two projects in the same corridor will inevitably cause the delay in the commencement of reinstatement operations within the ROW. This will have negative impacts on the following receptors:

- The landscape value along the ROW will be significantly degraded for an extended period of time
- Prolonged topsoil storage will cause the 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 and, in case of extensive washout, to the natural habitats surrounding the ROW

Air emissions

The potential for a cumulative impact to human health to occur from the simultaneous operation of closely located project facilities has been assessed and is not considered significant. This is because the potential impacts associated with each facility are expected to be fully mitigated through appropriate design of stacks and compliance with project standards.

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.

Catastrophic failure

It is acknowledged that it is remotely possible, following a series of extremely unlikely events and conditions, that a failure of the SCP pipeline may lead to an explosion of gas causing a failure of the BTC pipeline. Any additional risk associated with the proximity of the proposed SCP and BTC pipelines has been assessed. However, pipeline spacing and burial depth, which meets relevant project codes and standards, will ensure that the risk of such an occurrence is extremely remote.

Economic benefits and livelihoods

The cumulative socio-economic impacts resulting from the BTC, SCP and any other industrial development projects will, if well managed, provide an overall increase in wealth and access to livelihoods of the national population. The main national level benefit is increased government revenues from transit of oil and gas and taxes, which could contribute to improved social services, infrastructure, or debt reduction, depending on how the Government elects to invest the revenue.

Provided the use of local labour is maximised for both BTC and SCP, the combined effect of the two pipeline projects will be to at least 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 in the local villages.

Skills base

Both BTC and SCP projects will develop and implement a training programme. The cumulative impact of BTC and SCP will be to double the scale and impact of training. This will be particularly important for skilled workers, as it will enhance their earnings potential in their future careers. As a result of the BTC training programme, the SCP project will therefore be able to achieve a higher proportion of local employment than BTC. The combined impact of the projects will be to increase the overall skills base in major international quality construction projects in Georgia.

1.9 MANAGEMENT AND MONITORING

BP's approach to Environmental and Social Management is to apply the key principles of environmental and social protection to all oil 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 BTC 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

For operational phase, the Project will develop a specific operational EMS.

The effective implementation of the EMS is based on the development and implementation of a number of environmental and social plans. The plans include:

- Community Safety Management Plan
- Community Liaison Management Plan
- Worker Camp Management Plan
- Infrastructure and Services Management Plan
- Employment and Training Management Plan
- Transport Management Plan
- Resettlement Action Plan
- Cultural Heritage Management Plan
- Reinstatement Summary Plan
- Landscape Management Plan
- Pollution Prevention Management Plan
- Waste Management Plan
- Emergency Response Plan
- Oil Spill Response Plan

In some cases draft plans have already been developed and are included in the appendices for reference. These include the Reinstatement Summary Plan, Landscape Management Plan and Cultural Heritage Management Plan. Whilst the BTC Project has developed these draft Plans, it is largely the responsibility of the construction contractor to effectively implement them. BTC Co 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, expectations for the plans have been partially developed as framework plans, and must be finalised in conjunction with the construction contractor. The “frameworks” for these plans include the objectives, principles, standards to be met, resources required and general requirements. Additional draft measures that have been developed based on the ESIA mitigation measures will be provided to the construction contractor to assist in the development of the full plan.

BTC Co will review and approve these final plans following their development by the construction contractor. The construction contractor is then responsible for their implementation with BTC Co 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 and Oil Spill Response Plan.

1.10 OVERALL PROJECT ASSESSMENT

Alternative pipeline routes were evaluated, with the overall route selection and project design philosophy based on the following inherent mitigations:

- Avoidance of impact through careful design and route selection. Maximum potential to avoid impacts was achieved in the early project design stages through careful pipeline routing and avoidance of areas of environmental, cultural or social sensitivity
- Avoidance of houses and property so preventing the need for physical resettlement
- The BTC route has been selected through an extensive assessment process based on the following key considerations: environmental and social issues, terrain and geohazard assessment, constructability and long-term integrity of the pipeline, and security and safety
- Development and incorporation of direct mitigation measures into the design and construction process
- Environmental and community investment plans will be developed to offset any unavoidable High or Medium level 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 BTC project
- 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

The ESIA process has identified those BTC project activities that are predicted to result in environmental and social impacts, and provides 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 environmental and social mitigation measures identified in this ESIA describe how impacts will be managed throughout the various phases of the project. Impacts that could not be fully mitigated are termed "residual". The proposed mitigation measures have reduced the level of almost all of the residual impacts to a Low or Beneficial ranking. However, as discussed below, there are certain residual impacts that remain Medium or High.

Where practical, options for environmental and social programmes to offset these High and Medium residual impacts are being developed.

1.10.1 Environmental project assessment

The assessment process has shown that several beneficial impacts will ensue as a result of the BTC project. The key positive impacts are summarized below:

- In order to meet the 'no net loss' principle the BTC Project is developing an Environmental Investment Plan (EIP). Wherever possible, the EIP will go further than the "no net loss" principle with the objective of enhancement of biodiversity and provision of environmental additionality. The EIP projects will include consideration of protected areas (either designated or proposed) and protected species; areas of high ecological significance outside protected areas system, and capacity building for biodiversity management

- Contribution to an increased knowledge basis of the Georgian environment as a function of the BTC project baseline studies. The collected data will be shared and made public. This includes, for example, baseline data on flora, fauna, archaeology and cultural heritage; additional geotechnical data; and aerial and topographic mapping
- Clean up of identified areas of 3rd party pre-existing land contamination in areas required for the project, based upon contaminated land studies
- Skills transfer between international and national environmental consultancies and scientists eg data gathering and survey techniques; data interpretation, and national ecological expertise
- Capacity building at national and local level, including increased skills and knowledge that can be used by local organisations in response to future tenders, and for individuals to access future employment
- Increased public awareness of environmental issues, and increased opportunities for public, community, NGO and stakeholder participation in the EIA processes
- Implementation and increased awareness of international EIA standards

The assessment also showed that the majority of the negative impacts will be associated with the construction phase, and that most of these impacts can be mitigated through the implementation of good construction practices and application of site specific measures to protect localised receptors. The main residual impacts associated with the construction of BTC pipeline in Georgia are impacts to the landscape, to the ecology and, to a lesser degree, disturbance associated with noise. The sections below summarize the conclusions of the assessment for each of these three issues during construction, for operation of the pipeline, for unplanned events and for the interaction of the project with other related or unrelated activities.

1.10.1.1 Construction

Landscape impacts

High ranking landscape impacts owing to permanent modifications of high value landscapes are predicted to occur at the following locations:

- Tetritskaro (KP 84-92): forest landscape
- Mt Tavkvetili (KP 151-157): volcanic landscape identified as a “landscape monument” in the Georgian Red Data Book
- Tskhratskaro pass to Sakire (KP175.5-204): forest and alpine meadows
- River Mtkvari West crossing (KP 221): riparian landscape
- River Potshkovi North crossing (KP 238): riparian landscape

Residual impacts of Medium ranking to the landscape will occur throughout the ROW as a result of either the short-term visual intrusion, caused by the construction equipment in areas of high landscape value, or by permanent modifications of the landscape in a small number of areas of medium landscape value. With the exception of degraded landscapes that occur in the westernmost and eastern part of the route for an overall length of approximately 80km, the majority of the proposed pipeline route will be affected by short term visual intrusion and therefore by Medium ranking impacts.

The implementation of mitigation measures for several years after completion of construction activities will however reduce the significance of the impacts over time as the reinstated vegetation features will blend with the surrounding landscape.

Ecological impacts

The impacts to ecology are owing to the proposed pipeline route encroaching sensitive habitats, including a protected area (Ktsia Tabatskuri Managed Reserve) and the support zone of a national park (Borjomi Kharagauli National Park Support Zone). The High and Medium ranking residual impacts are summarized below:

- High ranking residual impacts to flora will occur owing to clearing of the ROW in two areas of dense primary forest: Tetritskaro (KP 84-92) and Tsikhisjvari /Sakire (KP 182 to 204). It must be noted that not all the ROW in these areas is covered by forest. The overall area of continuous forest encroached by the ROW at the two locations mentioned above is approximately 55 hectares. The clearance of forest along the ROW will result in the loss of a large number of trees of high conservation value, including a Georgian Red Data Book species (high mountain oak). It must be noted, however, that, no significant impacts are expected to occur with regard to the forestry practice in Georgia, or to forestry management in general, as the forests affected by the proposed pipeline project are a small fraction of the overall forest heritage of the country
- An additional High rank impact is the loss of the habitat (rhododendron scrub) of the globally threatened Caucasian black grouse on Mt Tavkvetili within the Ktsia Tabatskuri Manged reserve. The impact will be mitigated by clearing the scrub prior to the breeding/nesting season so that loss of individuals will be minimised. In addition, the scrub will be replanted after completion of the ROW reinstatement thus further mitigating the overall impact to the birds population
- The loss of localised populations of Georgian Red Data Book floral species during construction and until full restoration has taken place has been ranked as a Medium residual impact. This impact will occur in the Tetritskaro forest area and in the alpine meadows between Tskhratskharo and Sakire. These impacts will be mitigated by collecting the plants or their seeds/bulbs. The collected plants will be transplanted temporarily to suitable botanical gardens (most probably Tbilisi and Bakuriani), and re-planted after completion of the ROW reinstatement. If seeds were collected, replanting would take place through the sowing of the seeds or bulbs and subsequent management of the area
- Fragmentation of a continuous forest habitat in an area (Tetriskaro) that could be important from a mammal migration standpoint has not been assigned a ranking because the significance of this residual impact is not fully understood as there is no conclusive evidence that the ROW clearance and construction operations could significantly affect the migratory behaviour of such mammals. Additional surveys and monitoring will be undertaken to assess this issue further and develop suitable mitigation measures if required

Medium ranking impacts are summarised below:

- Kumisi plain (KP 29.4-53.2): potential impacts to rare populations of snake eyed lizard during construction
- Algeti River crossing (KP 53.2-53.8) and River Geti Crossing (KP 72.8): loss of regionally important riparian habitat
- Bedeni ridge (KP 92-108): Potential loss of part of extensive marsh orchid habitat
- Kizil Kilisa (KP 140): Fragmentation of local wildlife habitat (pine plantation)
- Mt Tavkvetili (KP 151-157): Potential loss of alpine wetland

Noise

Residual impacts with regard to noise fall in the "Medium" ranked category, and will occur where houses and human receptors are located within the band of influence of the construction noise. The impacts are primarily short-term, owing to the fast moving nature of the pipeline construction activities. While measures will be implemented to mitigate the noise, it is not expected that these impacts can be mitigated completely. Community relations and other forms of social relations management will ensure that no long-term adverse effects will result from this issue.

1.10.1.2 Pipeline operation

The operation of the pipeline will result in limited localised impacts. The most significant direct impacts of operation have been ranked as Medium and will be the generation of noise and visual intrusion at the location of Pump Station PSG2, given the high landscape value of the general area. There will also be impacts of a lesser extent including the visual intrusion of some of the other AGIs associated with the pipeline (in particular IPSG1, Block Valve G-B12, Block Valve G-B14 and Block Valve G-B15) located in areas of high ecological conservation value or with a very high landscape value. The implementation of the Landscape Management Plan will minimise these impacts.

1.10.1.3 Unplanned events

The potential for unplanned events and the consequence of such events on the habitats, rivers and groundwater resources crossed by the pipeline have also been analysed, with the aid of mathematical models that simulate the behaviour of the spilled oil in case of accident. The assessment shows that the likelihood of any event occurring and the risk of significant impacts resulting, are very low. In the unlikely case of an incident, the consequences of the impact could be significant depending on the scale of the event, the geographic location of the event site, and the local meteorological, geological and hydrogeological conditions.

Mitigation measures have been adopted to counter the risk of an oil spill on three fronts. Firstly, the design basis of the project includes many features to prevent a leak occurring, including routing around geohazards where possible and increased wall thickness in certain locations, among others. As a minimum, the pipeline has been designed to meet international standards and codes of practice thus ensuring the integrity of the pipeline. Secondly the design also includes many features for early identification of a spill event, including a leak detection system, selected groundwater monitoring, and regular route surveillance. Finally, an Oil Spill Response Plan will be developed (see the Oil Spill Response Plan Framework in Appendix E, Annex V) which will identify resources, responsibilities and equipment necessary for responding to a spill event, in the unlikely event that it should occur.

1.10.2 Socio-economic project assessment

Consultation revealed that the overall attitude of the interviewees in pipeline-affected communities[1] is positive towards the project, as their perception is that any disruption will be

[1] Pipeline affected communities are defined as those that are locate within (or partly encroach into) a 2km corridor either side of the route, or are within 5km of a potential worker camp or pipe yard. These communities are likely to experience and be affected by the activities of construction, operation and decommissioning of the pipeline.

temporary and offset by potential economic benefits both to their community and to Georgia. There will be a number of positive social impacts associated with the BTC project. These include:

- A Community Investment Programme, developed and implemented in communities adjacent to the pipeline corridor and associated facilities. This is intended to deliver benefits to those communities directly impacted by the project
- A limited number of direct employment opportunities on the project, primarily short term jobs during construction, with fewer, longer term, opportunities during operation
- Opportunity for provision of local goods and services to the project
- Skills development and training, increasing people's employment chances after the pipeline construction period for employment in other projects or specialized industry in the region
- Enterprise development, and 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 and utilities
- Benefit of the increased knowledge basis of the Georgia social and economic conditions along the pipeline route, as a function of the BTC project baseline studies. The data collected will be made public
- Skills transfer between international and national consultancies and increased experience in social data gathering/analysis and survey techniques
- Raising public awareness of socio-economic issues in Georgia, on an international, and national level, through publication of documents and consultation

Two of these positive aspects were particularly prominent during consultation: potential employment opportunities; and expenditure on local goods and services by construction workers.

The ESIA revealed that the majority of negative impacts will be associated with the construction phase, and that most of these impacts can be mitigated through the implementation of good construction practices and application of route level mitigation measures focusing on pipeline affected communities. The implementation and effectiveness of mitigation will be monitored and measures taken to reinforce, adapt or change the mitigation should it be required.

The main residual negative social impacts associated with the construction and operation of the BTC pipeline in Georgia are unmet local expectations on access to energy and employment, and ensuring effective community relations during the lifetime of the project. Impacts to infrastructure and services should be effectively mitigated and the land compensation process should minimise land and land-based livelihood impacts. Residual impacts in these two areas have been assessed as Medium significance, and the community relations measures will help to address them.

Accidents to community members, while potentially serious on an individual basis, are expected to be rare given the strong emphasis placed by BTC on health and safety. The sections below summarize the conclusions for each of the three key issues during construction and operation of the pipeline, and for the interaction of the project with other related or unrelated activities.

1.10.2.1 Construction and operation phase

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. While the project will not draw energy from community sources either during construction or operation, nor will it provide them with any additional power. Improving community access to energy is the responsibility of the Georgian Government, however BP is working with the relevant government departments to address these issues outside of the BTC project.

It is important that the BTC project provides accurate information on energy during the construction and operation phases (both energy usage and initiatives in partnership with the Georgian government) in order to avoid potential disappointment. After a year of regular consultation within communities energy expectations have been reduced to a certain extent, but will still require careful management in the future.

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 really be and this has been ranked as a high significance residual impact. It is therefore important to provide accurate information on this topic in order to avoid potential disappointment.

An employment strategy will be developed to 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.

Managing community relations

Only villages in Gardabani have previous pipeline experience. Hence, there is currently a lack of understanding in the majority of villages of what pipeline construction actually entails and the associated level of activity and duration. It is expected that tensions between communities and the pipeline project will inevitably rise during construction as a result of the wide ranging number of issues that will directly affect communities.

In addition, there was also some anxiety concerning the project and its potential impacts in two specific sets of communities. The first was in a series of community settlements in Gardabani, and the second in the Akhaltsikhe region. The concern in Gardabani was primarily related to land use restrictions and compensation but also reflected general anxiety following poor experience during the WREP project.

In Akhaltsikhe the concerns were generally related to the possible influx of ‘foreign’ workers into what are ethnically homogenous and relatively closed communities. The Community Liaison Management Plan will specifically address this issue.

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. Detailed management plans will be developed to assist in the formulation of effective

community relations by BTC Co and the contractor. These will ensure that people working on the project respect the local way of life, and that community concerns and complaints are dealt with sensitively and in a timely manner. Ongoing consultation will also be continued with regulators, NGOs and other interested stakeholders.

Impacts on communities are considerably reduced in the operation phase of the pipeline, however given the need to ensure community and pipeline safety, it is essential that the on-going community relations programme is well implemented, providing for regular dialogue to identify and understand community concerns and ensure safety awareness is maintained. The operational community relations phase also needs to address any outstanding community issues from construction.

1.10.2.2 Conclusion

In conclusion, it is generally anticipated that both the construction and operation will bring a series of short term and long-term benefits to the communities. This is despite some residual impacts relating to the construction of the pipeline, which need to be carefully managed through the mitigation measures set out in the document. The benefits provided will include, employment, provision of goods and services and the community investment programme, which will provide long term benefits to many communities, thereby off-setting any short term negative impacts.